

## Module 6: Sample Lesson Plans in Science

### Users:

All personnel at the school level

### Objectives of this Module:

Module 6 comprises sample lesson plans for challenging topics in Science.

The module also provides concise explanation of challenging topics at the beginning of the module. It briefly discusses the identification of challenging topics.

All the sample lesson plans are in accordance with the MOE Teaching Syllabus for Integrated Science (Primary 4-6).

The module has 2 types of sample lesson plans, type A and type B. The section on sample lesson plans of Type A has of 5 parts: **lesson overview**, **lesson plan**, **teaching hints**, **use of chalkboard** and **English as a teaching tool**. On the other hand, the section on sample lesson plans of Type B has 2 parts only: **lesson plan** and **English as a teaching tool**.

**The lesson overview** consists of introduction, objectives of the topic and the lesson, R.P.K. and details about the class. “Introduction” illustrates the importance and relevance of the lesson to real life. All the “objectives” are taken from the syllabus. “R.P.K.” states relevant previous knowledge that pupils are expected to have. “Details about the class” describes the current situation of the class in terms of pupils’ general information, academic progress, interest and attitude towards the subject. Further explanation about these can be found in Module 4 (4. Lesson Plan).

**The lesson plan** (sometimes also called lesson notes) is included in both Type A and Type B. The format of the lesson plan is the same as the standard lesson plan that GES provides.

The sample lesson plans of Type A also contain “lesson plan with teaching hints” on the next page of the standard lesson plan. The lesson plan with teaching hints is the same as the standard lesson plan on the previous page except for the speech blobs (rounded rectangular shapes) on the lesson plan. The speech blobs suggest where each of the teaching hints can be used.

**The teaching hints** provide suggested teaching approaches. It is designed in a such a way that each of the teaching hints elaborates how to deliver a particular teaching activity (e.g. Introduction, Activity 1,2...) in the development of a lesson. Because many of these teaching activities are linked with the core points of the lesson, successful delivery of the teaching activity should lead to a sound understanding of the core points.

The teaching hints deal mainly with general teaching approaches and questioning skills for particular teaching activities. The general teaching approaches describe how the teacher can lead pupils to the core points through the activities. When the activity is an experiment, the teaching approach explains how to conduct the experiment, paying special attention to the process skills of Science. The questioning skills should also help the teacher to lead pupils to reach a good understanding of the core points. It is recommended that teachers develop better teaching approaches and questions for the lesson and other lessons once they get the ideas that the teaching hints discussed/presented.

**The use of chalkboard** shows a suggested chalkboard plan. Well-organized chalkboard helps pupils understand what they are learning in the lesson. Teachers need to consider how to use and organize the chalkboard, and this part can help them consider such planning.

The section **English as a teaching tool** suggests effective use of English language in the Science

lessons. The section gives examples of English that can be used in particular activities. By using the actual content of the sample lessons, it helps pupils to understand Science content better. It should be noted that a section of Module 4 highlights the use of English language as a teaching tool for other subjects, with a general and rather theoretical explanation of its use.

**Use of Modules 6 for SBI/CBI demonstration activity (lesson)**

The CL and teachers can simply use some of the sample lesson plans for their SBI/CBI. They can also develop their own lesson plans for challenging topics using one of the samples as a model. Once CL and teachers have become familiar with the sample lesson plans and their teaching and learning strategies, it is strongly recommended that CL and teachers start developing their own initiated lesson plans for challenging topics.

**Adding Lesson Plans developed by CL and teachers**

Module 6 should be built-up by adding more sample lesson plans. CL and teachers must be encouraged to develop these lesson plans. CL and teachers have opportunities to develop lesson plans for challenging topics when preparing their SBI/CBI. Besides, CL can improve lesson plans when discussing the challenging topics with other CLs in CL Sourcebook Training.

Some of the lesson plans developed by CL and teachers will be added to the modules.

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## Identification of Challenging Topics

### Introduction

Some teachers in primary schools think that some topics are difficult or challenging to teach. They call the topics **challenging topics**. The teachers claim that the topics require subject teachers or specialists to teach them. However, with adequate preparation, teaching these topics should not be problematic. It is a matter of preparation not qualification. A little bit of extra effort and time to prepare a lesson makes a big difference and helps teachers to improve their lessons greatly.

This section provides some useful information about challenging topics for CLs and teachers. It helps to identify challenging topics.

### Preferred Topics

It is important to examine topics that teachers prefer to teach. When we understand why we prefer certain things, it becomes easier to see why we do not prefer other things. The preferred topics and the reasons for preferring those topics can help us to see why some topics are regarded as challenging.

Teachers in Primary schools seem to prefer teaching some topics in Science. Some examples are:

Food, Plants, Animals, the Family and the Community

There are some reasons why primary school teachers prefer teaching the topics listed above to others. They are shown below.

- The topics present real and familiar things.
- There are relevant curriculum materials and teaching/learning materials to use in lesson delivery.
- Local teaching and learning materials could be used.
- Teachers have interest in teaching familiar topics.
- The topics lend themselves to the use of the activity method of teaching.

### Challenging Topics in Science

The following are some examples of challenging topics in Science. These are based on opinions gathered from serving teachers at the primary school level.

Earthquakes, Formation of Clouds, Forces, Electrical Circuits, Constraints to Healthy Living: HIV/AIDS, Body Framework of Mammals, Magnets and non-magnets, Reflection of Light, Dispersal of Fruit and Seed, Pollination and Fertilization in Plants

It seems that the reasons why teachers perceive some topics as challenging vary from teacher to teacher. However, some typical reasons are identifiable. For example, one of the reasons is that challenging topics are seen to be abstract because they are not seen in real life situations. Another reason can be that challenging topics lack relevant curriculum materials that teachers can use as resource materials. The following are some of the reasons some teachers gave for regarding certain topics as challenging.

- Difficulty in getting Science and Environmental Studies experts to support teachers to teach the challenging topics.
- Lack of relevant teaching/learning materials to teach the challenging topics.
- Inadequate funds for purchasing some teaching/learning materials e.g. consumable materials.
- Some teachers' level of interest in Science and Environmental Studies.
- The problem of untrained teachers who lack content knowledge in Science and skills to handle Science and Environmental Studies.
- Large class sizes do not lend themselves to the activity method of teaching.

- Inadequate preparation by the teachers.
- Inadequate practical lessons in pre-service training at colleges due to the emphasis on passing of examination.

### **Summary**

The challenging topics are seen to be abstract in nature. Besides, there are no teaching/learning materials and relevant curriculum materials to support teachers to teach such topics. Some teachers use inappropriate teaching methodology, and large class size makes the use of the activity method of teaching difficult.

These problems can be overcome by adopting good strategies in the teaching/learning processes.

The fundamental principle that underlies the INSET programme is that teachers learn effectively through sharing implementation and discussion of a lesson with their colleagues. Thus, the CL and teachers should utilise the opportunities for lesson implementation and post-lesson discussion at SBI/CBI and CL Sourcebook Training to treat challenging topics.

## Sample Lesson Plans (TYPE A)

### **Lesson 1: Properties of Soil (Primary 5)**

1. Lesson overview
2. Lesson plan
3. Teaching hints
4. The Use of Chalkboard
5. English as a teaching tool

### **Lesson 2: Characteristics of Water and Other Liquids (Primary 4)**

1. Lesson overview
2. Lesson plan
3. Teaching hints
4. The Use of Chalkboard
5. English as a teaching tool

## Lesson 1: Primary 5, Unit 2      Properties of Soil

### 1. Lesson Overview

#### Introduction

Soils are very common in our environment. Pupils see different kinds of soil on their way to school. Many pupils have played with soil at some stage in their growth/development, touching and feeling them with their hands. Some of them know that soils support plants and can be used in building houses and roads (taught in Primary 4). From these experiences, it is obvious that soils are reasonably familiar things to the pupils; however, many pupils do not pay particular attention to its characteristics. It is important to know about the characteristics of soil because it often determines which soil is more preferable for a specific use. For example, some particular kinds of soil are useful for growing certain types of crops. Having a good understanding of the characteristics of soil is very helpful for farming.

In this lesson on Properties of Soil, pupils are expected to observe and classify different types of soil. They are to consider the uses of soil in our everyday life, and then explore which soils are best for various crops.

The teacher can organise group activities depending on the class size and the nature of the activities.

The teacher should move around in the class when pupils are working on the activities, spending ample time with them and paying attention to them.

#### General Objectives of the Topic (Soil in Primary 5)

The pupil will

- acquire basic knowledge about soil.
- acquire skills in controlling soil erosion.
- understand the importance of soil in crop production.

#### Specific Objectives of the Lesson (Properties of Soil)

By the end of the lesson, pupils will be able to:

- determine at least two differences among loamy, sandy and clayey soils.
- demonstrate the water holding capacity of loamy, sandy and clayey soils.

This topic (properties of soil) is found in Unit 2 of the primary 5 syllabus. It deals with how a sample of soil can retain water or allow water to pass through it. The units that pupils learn before and after this unit are shown in Table 1. The table also indicates the place of the topic, Properties of Soil, in bold.

**Table 1: Class and Unit that this topic can be found**

Class	Unit
Primary 4	Unit 1: Composition and uses of soil
Primary 5	Unit 1: Types of soil <b>Unit 2: Properties of soil</b> Unit 3: Soil erosion – causes, effects and control
Primary 6	Unit 1: Land degradation Unit 2: Soil fertility

### **Relevant Previous Knowledge (R.P.K.)**

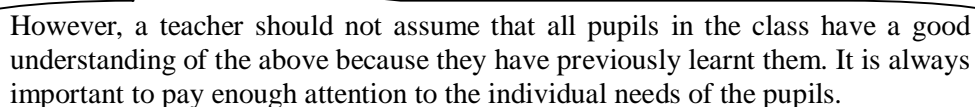
Pupils are familiar with the type of soil in the school garden.

In Primary 4, pupils have already learnt the following:

- Soil is made up of particles of stone and other materials like dead plants, animals and air.
- Soil supports plants.
- Soil is useful in crop production.
- It can also be used in building houses and roads.
- Soil can be used in making pots, bowls and ovens.

In Primary 5 in previous lessons, pupils have already learnt the following.

- Soil can be grouped into sandy, clayey and loamy.



However, a teacher should not assume that all pupils in the class have a good understanding of the above because they have previously learnt them. It is always important to pay enough attention to the individual needs of the pupils.

### **Details about the Class**

The “Details about the Class” explains the current situation of the class in terms of general information about the pupils, academic progress, interest in the subject and attitude towards the subject.

(Refer to Module 4: 4.1.3. “**Details about the Class**” for further explanation.)

#### **( This is an example )**

This class is made up of 50 pupils (28 girls and 22 boys). Majority of the pupils seem to have a good understanding of the uses of soil while a few pupils have a strong interest in the characteristics of soil. Approximately half of them have had some kind of farming experience with their parents. Although all of them participated in the previous lesson that dealt with grouping soil into sandy, clayey and loamy, roughly 10 of them are still struggling with how to group them.

The next section shows samples of lesson plans taken from the primary school syllabus. Some of them present the format with suggested teaching and learning activities. Others have suggested teaching hints added to certain parts of the lessons and are intended to help the teacher to achieve the core points for the various stages of the lesson.

## 2. Lesson Plan

### PROPERTIES OF SOILS

**SUBJECT:** Integrated Science

**REFERENCES:** 1. Primary School Integrated Science Syllabus pg 38-39

**CLASS:** Primary 5

**DETAILS ABOUT THE CLASS:** Majority of the pupils seem to have a good understanding of the uses of soil while a few pupils have a strong interest in the characteristics of soil.

DAY/DATE/TIME/DURATION	TOPIC/SUB-TOPIC	OBJECTIVES/R.P.K.	TEACHING/LEARNING MATERIALS TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/EXERCISE
Wednesday 2 <sup>nd</sup> of Oct. 06 11:00 ~ 60 mins	<b>TOPIC:</b> TYPES OF SOIL.  <b>SUB-TOPIC:</b> PROPERTIES OF SOIL.	<b>OBJECTIVES:</b> By the end of the lesson pupils will be able to: – determine two differences in loamy, sandy and clayey soils; – demonstrate the water holding capacity of loamy, sandy and clayey soils.  <b>R.P.K.:</b> Pupils are familiar with the type of soil in the school garden.	<b>TLM:</b> loamy, sandy, and clayey soils, funnels, cotton wool, empty transparent plastic containers, water, cups, sticks  <b>INTRODUCTION</b> Short talk or discussion about real life experiences related to water holding capacity. (eg: erosion of sports grounds of the school ) Through question and answer method, pupils state the types of soil near their houses and in the school garden.  <b>ACTIVITY 1:</b> Pupils touch/feel and describe the soil samples in terms of colour, texture, and particle size and record their observations in a table.  <b>ACTIVITY 2:</b> Using the same type of soil samples, pupils find out if the different types of soil allow water to pass through them at the same rate. Let the group leaders read out their observations and discuss their groups' findings with the class. For the instructions, refer to worksheet or teaching approach on an attached paper.  <b>APPLICATION:</b> Pupils discuss which soil will be best for planting in the school garden or their gardens at home (Note that different kinds of plants also determine suitable soil type.)  <b>CONCLUSION:</b> e.g. Loamy soil is suitable for growing cabbage.	<b>CORE POINT 1:</b>  Sandy soil has larger particles and is brownish in colour. It feels very rough between the fingers. Clayey soil has smaller particles and is whitish or brownish in colour depending on its location. It feels very smooth and has medium size particles.  <b>CORE POINT 2:</b>  Different soils allow water to drain through them at different rates. Sandy soil allows water to pass through it easily. Loamy soil allows water to pass through it better than clayey soil.  <b>CORE POINT 3:</b>  Clayey soil retains water most while loamy soil holds sufficient water for plant growth.	<b>ORAL QUESTIONS:</b> What type of soil is in the school garden? What type of soil is on the school compound? What is the colour of the soil in the school garden?  <b>WRITTEN QUESTIONS:</b> There are 3 main types of soil. Which soil type will dry up more quickly and why? Which soil would be best for growing crops in the school garden and why?



## Lesson Plan with Hints

The lesson plan below shows speech blobs (rounded rectangular shapes) that indicate hints for teaching the various stages. The hints for teaching deal with specific skills for lesson delivery and they are explained in detail in the following pages. The position of each speech blob suggests where each one of the hints can be used.

DAY/ DURATION	TOPIC/ SUB-TOPIC	OBJECTIVES/ R.P.K	TEACHING/LEARNING MATERIALS TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/ EXERCISE
Wednesday  60MINUTES	<b>TOPIC:</b> TYPES OF SOIL.  <b>SUB-TOPIC:</b> PROPERTIES OF SOIL.	<b>OBJECTIVES:</b> By the end of the lesson pupils will be able to: – determine two differences in loamy, sandy and clayey soils – demonstrate the water holding capacity of loamy, sandy and clayey soils.  <b>R.P.K.:</b> Pupils are familiar with the type of soil in the school garden.	<b>TLM:</b> loamy, sandy, and clayey soils, funnels, cotton wool, empty transparent plastic containers, water, cups, sticks  <b>INTRODUCTION:</b> Short talk or discussion about real life experiences related to water holding capacity. Through question and answer method, pupils state the types of soil near their houses and in the school compound.  <b>ACTIVITY 1:</b> Pupils touch/feel and describe the soil samples in terms of colour, texture, and particle size and record their observations in a table.  <b>ACTIVITY 2:</b> Using the same type of soil samples, pupils find out if the different types of soil allow water to pass through them at the same rate. Let the group leaders read out their observations and discuss their groups' findings with the class.  <b>APPLICATION:</b> Pupils discuss which soil will be best for planting in the school garden, or their gardens at home. (Note that different kinds of plants also determine suitable soil type.)  <b>CONCLUSION:</b> e.g. Loamy soil is suitable for growing cabbage.	<b>Hints for Introduction</b>  <b>Hints for Activity 1</b>  <b>CORE POINT 1:</b> Sandy soil has larger particles and is brownish in colour. It feels very rough between the fingers. Clayey soil has smaller particles and is whitish or brownish in colour depending on its location. It feels very smooth and has medium size particles.  <b>CORE POINT 2:</b> Different soils allow water to drain through them at different rates. Sandy soil allows water to pass through it easily. Loamy soil allows water to pass through it better than clayey soil.  <b>CORE POINT 3:</b> Clayey soil retains water most while loamy soil holds sufficient water for plant growth.  <b>Hints for Application</b>	<b>ORAL QUESTIONS:</b> What type of soil is in the school garden? What type of soil is on the school compound? What is the colour of soil in the school garden?  <b>WRITTEN QUESTIONS:</b> There are 3 main types of soil. Which soil type will dry up more quickly and why? Which soil would be best for growing crops in the school garden and why?

### 3. Teaching Hint

The discussion that follows is the suggested teaching approaches for presenting the lesson whose lesson plan can be found on the previous page.

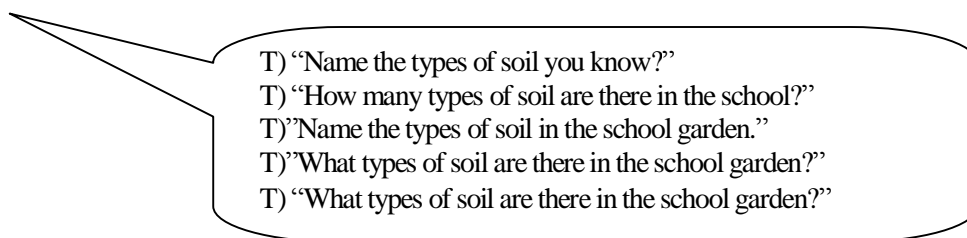
#### **Hints for Introduction**

##### **Questioning Skills for Introduction**

In the introduction, the teacher can use any (or all) of the approaches below.

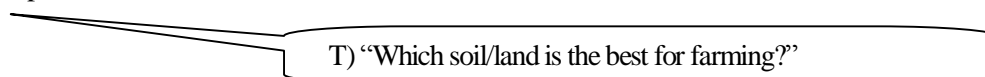
a) questions that review pupils' R.P.K.

Example



b) questions that relate the lesson to real life situations.

Example



Note: Different crops do well in different soils so any soil type mentioned should be supported with the appropriate crops. Eg. sandy soil – shallot/onions; humus- pepper.

#### **Hints for Activity 1**

Activity 1 is linked with Core Point 1. Hints for Activity 1 lead to a good understanding of Core Point 1.

**Core Point 1** (of Activity 1): Sandy soil has larger particles and is brownish in colour. It feels very rough between the fingers. Clayey soil has smaller particles and is whitish in colour. It feels very smooth and has small size particles. Loamy soil has particles with a mixture of sizes and is black in colour.

##### **Approach to Activity 1 (for Core Point 1):**

An approach to Activity 1 is shown below as an example.

1. Three soil samples (sandy, clayey and loamy soils) are needed for this activity and they can be obtained from the school garden and the neighborhood.
2. In groups, pupils examine the samples carefully.
3. Pupils touch/feel and describe the colour, particle size and texture of the three samples of soils.
4. Pupils record their observations in Table 2.
5. Discuss pupils' observations and classify the soil types according to the size of particles and texture.

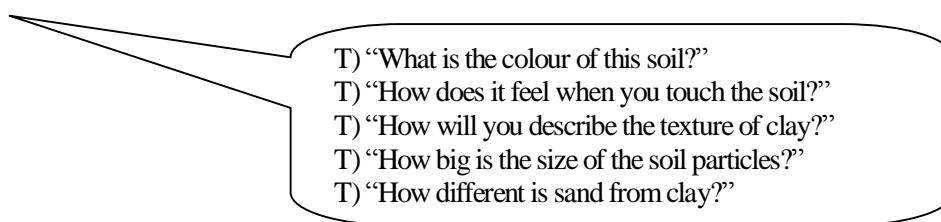
**Table 2: Properties of soil types**

Type of soil	Colour	Size of particles	Feel or texture
Sandy			
Clayey			
Loamy			

**Questioning Skills for Activity 1**

In Activity 1, pupils have opportunity to make their own observations. A teacher should use questions that elicit the observations pupils have made. (See Module 4 General Pedagogy: 2.5 “Questioning Skills” for further explanation.)

Examples



**Hints for Activity 2**

Activity 2 is linked with Core Point 2. Hints for Activity 2 lead to a good understanding of Core Point 2.

**Core Point 2** (of Activity 2): Different soils do not allow water to drain through them at the same rate. Sandy soil allows water to pass through it easily. Loamy soil allows water to pass through it better than clayey soil.

**Approach to Activity 2 (for Core Point 2)**

An approach to Activity 2 is shown below as an example.

1. Using the soil samples, pupils find out if the different types of soil allow water to pass through them at the same rate.
2. Let pupils predict what would happen to the water in the three types of soils (Pupils can be asked to write it down).
3. Pupils or group leaders present their predictions to the class. (Teacher writes them on chalkboard).
4. Carry out the experiment (Either teacher-led demonstration or group activity, depending on availability of the apparatus and time).
5. As a group, pupils record the results on the board or in their exercise books
6. Pupils share the results with members of other groups.
7. Discuss them in class, comparing them with the predictions pupils made before the experiment.

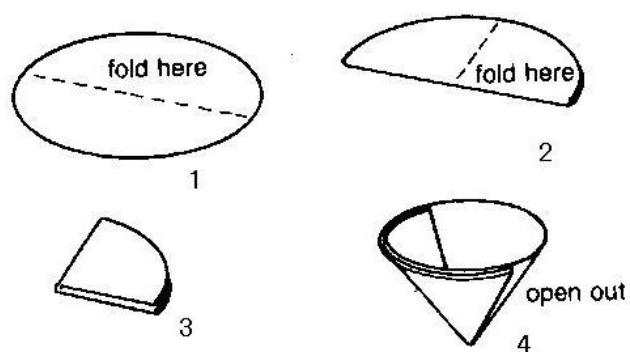
### Preparation of Teaching and Learning Materials for the lesson

#### Resources:

- 3 different transparent containers of equal size (beakers/ plastic bottles/ glasses)
- Samples of sandy, clayey and loamy soils (which are locally available.)
- Filter paper/a piece of paper/ cotton wool
- 3 funnels
- A clock/stop watch/wrist-watch

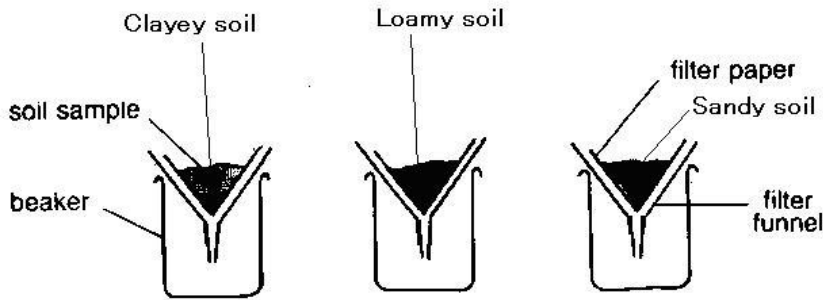
#### Steps to follow:

##### 1. Fold the filter paper as shown.

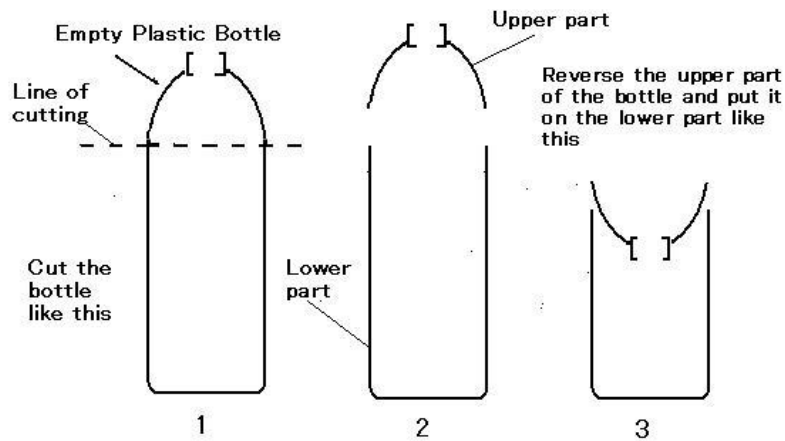


When filter paper is not available, we can improvise it. Instead of filter paper, we can use cotton wool or a piece of tissue from toilet roll.

2. Set up the apparatus.



When funnels and beakers are not available, other materials can be used, catering for the same purpose. A teacher can improvise them. One other example, which uses empty plastic bottles, is shown below.



### Questioning Skills for Activity 2(Core Point 2)

In Activity 2, pupils are given the opportunity to carry out an experiment that focuses on discovery. This activity allows a teacher to use a variety of questions, including high order questions, such as analysis, synthesis and application questions.

The teacher can also highlight some of the process skills in this activity, asking questions that are related to process skills. Examples of these questions and process skills are shown below. (See Module 4: 2.3.2 Generic/Process Skills and Science for further explanation.)

Example

Question	Process Skill
“What is likely to happen?”	Predicting
“Which type of soil is likely to hold water the longest?”	Predicting
“Why will the clayey soil hold water longest?”	Hypothesising
“How will you group the soils?”	Classifying
“What will you need to make this experiment fair?”	Handling apparatus
“How would you do it?”	Designing
“What will you measure?”	Measuring
“How will you record the results?”	Recording (Writing)
“How will you share your results?”	Reporting/communicating

### Hints for Application

Application is linked with Core Point 3. Hints for Application leads to a good understanding of Core Point 3.

**Core Point 3** (of Application): Clayey soil retains water most while loamy soil holds sufficient water for plant growth.

### Approach to Application (for Core point 3)

An approach to application is shown below as an example.

1. Having obtained the findings that pupils got from Activity 2, pupils discuss the soil type that retains water most.
2. Teacher asks which soil is best for growing crops.
3. Teacher guides the pupils through the information to discover that crops need just sufficient amount of water. It should neither be too little nor too much.
4. Through a discussion on which soil is best for growing crops, let pupils synthesise both the information that they obtained from the activity and the information their teacher has just given.
5. After pupils come to a conclusion, teacher asks if the type of soil in the school garden is suitable for growing crops.
6. Encourage pupils to suggest the types of soil that would be best or suitable for planting a local crop.

### Questioning Skills for Generating Application of the Concept

A teacher can use the following questions for summing up the lesson. Example

Question	Process Skill
“What have you found?”	Evaluating
“How do you compare the results?”	Discussing
“What might be said about the relationship between water holding capacity and size of particles of soil?”	Generalising
“How will you tell your friends about today’s finding?”	Communicating

### Related Information

The smaller the particles of soil, the greater the total surface area of the particles on which the water can collect. The further apart the particles, the more easily water passes through.

Clayey soil has very small particles and holds water better than sandy and loamy soils, but it tends to become waterlogged and develops cracks when dry.

Sandy soil holds little water because it has large spaces between its particles.

Loamy soil holds water well. It does not become waterlogged. Humus also increases the water holding ability of soils.

**“The ability of soil to hold back water is called the water holding/ retention capacity of the soil.”**

#### 4. The Use of Chalkboard

A sample layout of chalkboard writing is shown below.

3<sup>rd</sup>/May/06

#### Properties of Soil

Types of soil we can find in the school garden.  
Examples: Sand, clay, loam and so on.

#### Activity 1: Properties of Soil

Types of soil	Colour	Size of particles	Feel or texture
Sandy			
Clayey			
Loamy			

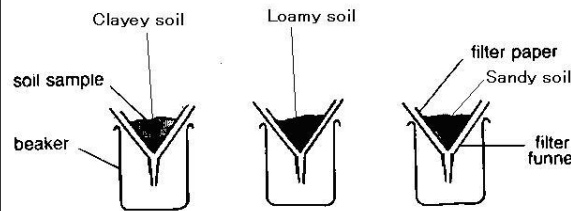
Sandy soil has larger particles and is brownish in colour. It feels very rough between the fingers. Clayey soil has smaller particles and is whitish or brownish in colour depending on its location. It feels very smooth and has medium size particles.

**Activity 2:** Which soil allows water to pass through it more easily?

**Materials:** TLM: loamy, sandy, and clayey soils, cotton wool, funnels and beakers (or empty transparent plastic containers), water, cups, sticks

**Aim:** To find out if the different types of soil allow water to pass through them at the same rate.

**Set-up:**



**Predictions:**

**Group A:** Clay allows water to pass through it faster than others.

**Group B:** There is no difference. They are all the same.

**Group C:** Water passes through sand at the fastest rate.

**Group D:** Different soils do not allow water to drain through them at the same rate.

**Result:**

**Table: Results of the Experiment**

Type of Soil	What happened to the water after 3 minutes?
Clay	
Sand	
Loam	

**Conclusion (of activity 2):**

Allow water to pass through them at different rates. Sandy soil allows water to pass through it easily. Loamy soil allows water to pass through it better than clayey soil.

**Application and Conclusion:**

Clayey soil retains water most while loamy soil holds sufficient water for plant growth.

Loamy soil is suitable for growing cabbage.

**Exercise:**



## 5. English as a Teaching Tool

**(a) Activity 1:** In the first activity of this lesson, the pupils have to describe the feel or texture of the three soil samples. The pupils will be able to describe the soils in their local language. The teacher can help the pupils to learn some English words to describe the differences.

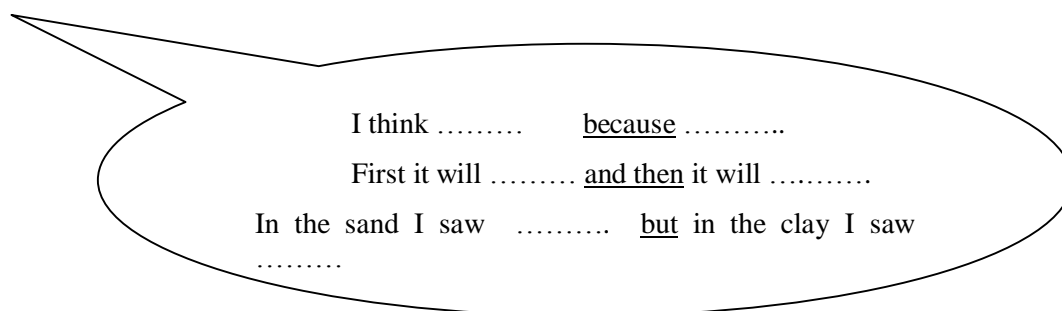
The following descriptive words will be helpful:

clay	sand	loam
small grains smooth sticky (grains stick together) You can make it into a ball	bigger grains rough You can pour it It runs through your fingers	crumbly loose a mixture of textures bigger and smaller pieces together

**(b) Activity 2:** In this lesson the pupils are asked to write down what they think will happen before they do the experiment. After the teacher has explained the experiment she should give the pupils some ideas and some words to help them. For example the teacher can say:

“Do you think it will be the same for each type of soil? What will be different? Will the water pass through one type of soil quickly and move through another type of soil more slowly? Now I want you to write down some sentences to say what you think will happen in this experiment. Here are some words that you can use in your writing” eg. Fast, slowly, quickly, holds, doesn't hold.

Encourage the pupils to explain their ideas fully using the following sentence structures:



It is important for the teacher to give clear instructions for the pupils to follow, using phrases which they have heard before so that they become familiar with what they are expected to do.

For example:

- Give a clear title which tells the pupils what they are going to be studying.
- Tell the pupils what equipment is needed for the experiment.
- Make the instructions brief, in simple steps and in clear English.

Each of these points will also provide a list of vocabulary items to help pupils with their writing.

The experiment could be written on the blackboard for the pupils to copy into their exercise book (see below).

Experiment :        To Investigate How Different Soils Hold Water

What you need:    three pieces of cloth, three samples of soil, three sieves, three equal quantities of water, three containers, a clock or timer.

Step 1    Put a piece of cloth in a sieve. Do the same with two other sieves.

Step 2    Put each sieve at the mouth of a container.

Step 3    Label the sieves A, B and C.

Step 4    Put some sand on sieve A.

Step 5    Put the same quantity of clay on sieve B.

Step 6    Put the same quantity of loam on sieve C.

Step 7    Pour the same amount of water onto each sieve.

Step 8    Note the time. After 3 minutes, observe which type of set-up has most water in the sieve and which type of set-up has most water in the container.

Step 9    Record your findings in the table below.

**Table 3: Results of the Experiment**

Type of Soil	What happened to the water after 3 minutes?
Clay	
Sand	
Loam	

## Lesson 2: Primary 4, Unit 2: Characteristics of Water and Other Liquids

### 1. Lesson Overview

#### Introduction

Water is the most common liquid in the world. We drink it, wash in it and do many things with it. In many ways water controls our lives. It determines where we can live and whether we can grow crops for food and also determines which weather we have. All living things use water- plants, animals and people. About 2/3(70%) of the human body is made up of water. The body needs about 2 litres every day. Water forms part of our food and drinks. It replaces the water that is lost through sweat, urine and breathing. Water is more important than food (you can survive between 5 to 10 days only without water but can do for 50 to 60 days even without food if you have water). Water is a compound with chemical formula H<sub>2</sub>O (2 Hydrogen atoms and 1 Oxygen atom).

#### General Objectives of the topic (Water in primary 4)

The pupil will:

- recognise various sources of water.
- relate water to other liquids.
- appreciate the importance of water.
- understand the dangers associated with polluting water bodies.

#### Specific Objectives of the lesson (Characteristics of water and other liquids)

By the end of the lesson, pupils will be able to:

- identify water from other liquids.
- compare water to some other liquids.

This topic (Characteristics of Water and other Liquids) is found in Unit 2 of the primary 4 syllabus. The units that pupils learn before and after this unit are shown in Table 4. The table also indicates place of the topic, Characteristics of Water and other Liquids, **in bold**.

**Table 4: Class and Unit that this topic can be found**

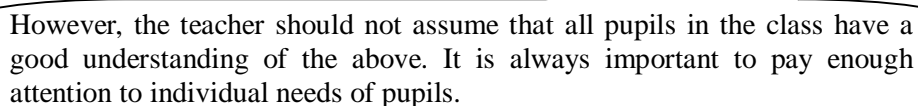
Class	Unit
<b>Primary 4</b>	Unit 1: Sources of water <b>Unit 2: Characteristics of water and other liquids</b> Unit 3: Uses of water Unit 4: Water pollution
Primary 5	Unit 1: Purification of water Unit 2: Water as a solvent Unit 3: Water cycle

### Relevant Previous Knowledge (R.P.K.)

Pupils use water and other liquids (e.g. kerosene and fruit juice) in their everyday activities.

In Primary 4, pupils have learnt that:

- Water may be obtained from rivers, taps, wells, lakes, lagoons, streams, rain and the sea.
- Water may contain different kinds of impurities.



However, the teacher should not assume that all pupils in the class have a good understanding of the above. It is always important to pay enough attention to individual needs of pupils.

### Details About the Class

The “Details about the Class” explains the current situation of the class in terms of general information about the pupils, academic progress, interest in the subject and attitude towards the subject. (Refer to Module 4: 4.1.3. “**Details about the Class**” for further explanation.)

(This is an Example)

This class is made up of 58 pupils (33 girls and 25 boys). Majority of the pupils know the basic differences among the liquids that will be used in the lesson. However, many of them have difficulty in expressing them in English words. Special attention is needed to develop the pupils’ understanding of these English vocabularies. The concepts of thickness and thinness are to be developed. Some pupils are very much familiar with kerosene but there are some who have not touched it before. Pupils have learnt about the sources of water in the previous lesson, and understand that water may contain different kinds of impurities. Thus, it is important to stress that the water discussed in this lesson is pure water, without impurities, so as not to confuse the pupils.

2. Lesson Plan

**WATER AND OTHER LIQUIDS**

**SUBJECT:** Integrated Science

**REFERENCES:** 1. Primary School Integrated Science Syllabus pg 9

**CLASS:** Primary 4

**DETAILS ABOUT THE CLASS:** Special attention is needed to develop the pupils' understanding of the English vocabularies that explain the differences among the liquids.

DAY/DATE/TIME/DURATION	TOPIC/SUB-TOPIC	OBJECTIVES/R.P.K.	TEACHING/LEARNING MATERIALS TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/EXERCISE																																									
<p>WED.</p> <p>1<sup>st</sup> of Oct. 06</p> <p>9:00 ~ 30mins.</p>	<p><b>TOPIC:</b></p> <p>Water and other liquids</p> <p><b>SUB-TOPIC:</b></p> <p>Characteristics of water and other liquids</p>	<p><b>OBJECTIVES:</b></p> <p>By the end of the lesson, pupils will be able to:</p> <ul style="list-style-type: none"> <li>- identify water from other liquids</li> <li>- state at least 2 differences between water and other liquids.</li> </ul> <p><b>R.P.K:</b></p> <p>Pupils use water and other liquids in their every day activities.</p>	<p><b>TLMs:</b></p> <p>Water, orange juice, kerosene, cooking oil, e.g. palm oil in transparent bottles with lids, stop watch, rulers, marker, pen, and funnel.</p> <p><b>INTRODUCTION:</b></p> <p>Lesson is introduced through Q and A, for example,</p> <p>“What kind of liquid do you use in making stew?”</p> <p>“Do all liquids have taste, smell and colour?”</p> <p><b>ACTIVITY 1: Group activity</b></p> <p>In groups, pupils compare the liquids, looking at the differences in colour, smell and texture (thick/thin). Complete the table.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">Liquid</th> <th colspan="2">Colour</th> <th colspan="2">Smell</th> <th colspan="2">Texture</th> </tr> <tr> <th>With colour</th> <th>Without colour</th> <th>With smell</th> <th>Without smell</th> <th>Thick</th> <th>Thin</th> </tr> </thead> <tbody> <tr> <td>Water</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Cooking oil</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Orange Juice</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Kerosene</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Liquid	Colour		Smell		Texture		With colour	Without colour	With smell	Without smell	Thick	Thin	Water							Cooking oil							Orange Juice							Kerosene							<p><b>CORE POINT 1:</b></p> <p>Some liquids have colour. (eg. Orange juice)</p> <p>Others have taste and smell.(eg. Kerosene)</p> <p>Pure water is colourless, odourless and tasteless.</p>	<p>State 2 differences between water and cooking oil.</p> <p>Which liquid has coloured: kerosene or orange juice?</p> <p>Water flows more slowly than cooking oil. True or False?</p>
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**ACTIVITY 2: Demonstration**

The teacher and pupils use TMLs to demonstrate an activity to find out which liquid pours more easily than others.

**Procedure:**

1. Obtain two identical plastic bottles and place a funnel on each.
2. Mark each bottle equally.
3. Measure some water and put it into one of the bottles through the funnel.
4. Time it and check how long it takes to reach the mark.
5. Repeat the activity with the cooking oil.
6. Copy and complete the table.

Liquid	Time it takes to reach the mark (In seconds)	Does it flow fast or slow?		How does it feel between your fingers?	
		Fast	Slow	Thick	Thin
Water					
Cooking Oil					

**APPLICATION:**

“You got water from a borehole in your neighborhood. How would the water be different from water from a river or muddy pond?”

**CORE POINT 2:**

Some liquids flow more slowly than others. Cooking oil flows more slowly than water.

## Lesson Plan with Hints

The lesson Plan below has speech blobs (rounded rectangular shapes) that show hints for teaching approaches. The hints for teaching approaches deal with specific skills of lesson delivery and they are explained in detail in the following pages. The position of each balloon indicates where each one of the hints can be used.

DAY/ DURAT ION	TOPIC/ SUB-TOPIC	OBJECTIVES / R.P.K.	TEACHING/LEARNING MATERIALS TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/ EXERCISE																																									
WED.  60mins.	<p><b>TOPIC:</b> Water and other liquids</p> <p><b>SUBTOPIC:</b> Characteristic s of water and other liquids</p>	<p><b>OBJECTIVES:</b> By the end of the lesson, pupils will be able to:</p> <ul style="list-style-type: none"> <li>- identify water from other liquids,</li> <li>- state at least 2 differences between water and other liquids.</li> </ul> <p><b>R.P.K.:</b> Pupils use water and other liquids in their every day activities.</p>	<p><b>TLMs:</b> Water, orange juice, kerosene, cooking oil in transparent bottles with lids, stop watch, rulers, marker, pen, and funnel.</p> <p><b>INTRODUCTION:</b> “What kind of liquid do you use in making stew?” “Are all liquids tasteless and odourless?”</p> <p><b>ACTIVITY 1: Group activity</b> In groups, pupils compare the liquids, looking at the differences in colour, smell and texture (thick/thin). Complete the table.</p> <table border="1"> <thead> <tr> <th rowspan="2">Liquid</th> <th colspan="2">Colour</th> <th colspan="2">Smell</th> <th colspan="2">Texture</th> </tr> <tr> <th>With colour</th> <th>Without colour</th> <th>With smell</th> <th>Without smell</th> <th>Thick</th> <th>Thin</th> </tr> </thead> <tbody> <tr> <td>Water</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Cooking oil</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Orange Juice</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Kerosene</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Liquid	Colour		Smell		Texture		With colour	Without colour	With smell	Without smell	Thick	Thin	Water							Cooking oil							Orange Juice							Kerosene							<p><b>Hints for Activity 1</b></p> <p><b>CORE POINT 1:</b> Some liquids have colour. Others have taste and smell. Pure water is colourless, odourless and tasteless.</p>	<p>State 2 differences between water and cooking oil.</p> <p>Which liquid is coloured, kerosene or orange juice?</p> <p>Water flows more slowly than cooking oil. True or False?</p>
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**ACTIVITY 2: Demonstration**

The teacher demonstrates an activity to find which liquid pours more easily than others.

**Procedure:**

1. Obtain two identical plastic bottles and place a funnel on each.
2. Mark each bottle equally.
3. Measure some water and put it into one of the bottles through the funnel.
4. Time it and check how long it takes to reach the mark.
5. Repeat the activity with the cooking oil.
6. Copy and complete the table.

Liquid	Time it takes to reach the mark (In seconds)	Does it flow fast or slow?		How does it feel between your fingers?	
		Fast	Slow	Thick	Thin
Water					
Cooking Oil					

**APPLICATION:**

“You got water from a borehole in your neighborhood. How would the water be different from water from a river or muddy pond?”

**CORE POINT 2:**

Some liquids flow more slowly than others. Cooking oil flows more slowly than water.

**Hints for Activity 2**

**Also See “the Use of Chalkboard”.**



### 3. Teaching Hints

#### **Hints for Activity 1**

Activity 1 is linked with Core Point 1. Hints for Activity 1 lead to a good understanding of Core Point 1.

**Core Point 1**(of Activity 1): Some liquids have colour. Others have taste and smell.

#### **Approach to Activity 1(for Core Point 1)**

An approach to Activity 1 is shown below as an example.

#### Comparing liquids

Materials: 1. Water 2. Kerosene 3. Orange juice 4. Cooking oil (eg. Palm oil) 5. Transparent bottles with lids

Procedure: Look at the samples of different liquids.

Safty: **DO NOT** taste any of the liquids.

Complete the table below.

**Table 5 Comparing liquids**

Liquid	Colour		Smell		Texture	
	With colour	Without colour	With smell	Without smell	Thick	Thin
Water						
Cooking oil						
Orange Juice						
Kerosene						

#### **Questioning Skills for Activity 1**

T) “Do they have colour or they are colourless? ”  
 T) “Do they smell?”  
 T) “Do they feel thick or thin?” (After rubbing a little of each between your fingers.)

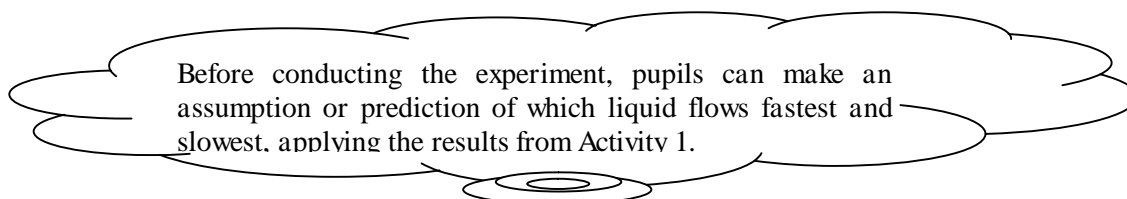
### Hints for Activity 2

Activity 2 is linked with Core Point 2. Hints for Activity 2 lead to a good understanding of Core Point 2.

**Core Point 2**(of Activity 2): Some liquids flow more slowly than others. Cooking oil flows more slowly than water. Pure water is colourless, odourless and tasteless.

### Approach to Activity 2 (for Core Point 2)

An approach to Activity 1 is shown below as an example.



### Which liquid pours more easily?

**Materials:** Water, cooking oil (eg. palm oil), plastic bottles, ruler, marker, stopwatch (a stopwatch/clock/wrist watch), funnels,

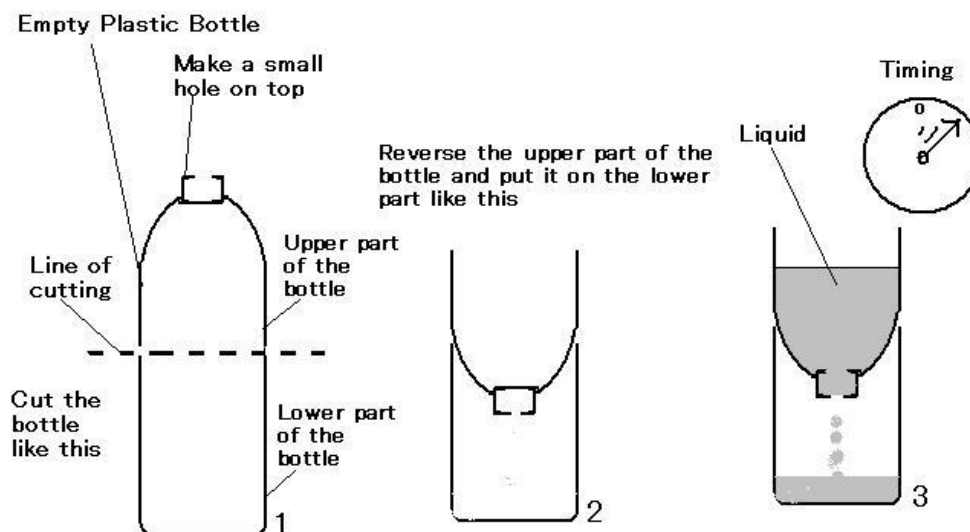
### Procedure

1. Obtain two identical plastic bottles and place a funnel on each.
2. Mark each bottle equally.
3. Measure some water and put it into one of the bottles through the funnel.
4. Time it and check how long it takes to reach the mark.
5. Repeat the activity with the cooking oil.
6. Copy and complete Table 6.

**Table 6: Which liquid flows faster?**

Liquid	Time it takes to reach the mark (In seconds)	Does it flow fast or slow?		How does it feel between your fingers?	
		Fast	Slow	Thick	Thin
Water					
Cooking Oil					

When funnels are not available, empty plastic bottles can be used instead. An example of the construction of the apparatus is shown below.



### Questioning Skills for Activity 2

- T) "Why must the bottles be identical?"  
 T) "Why must the same volume of each liquid be used?"

### Related Information

Pure water is colourless, odourless (has no smell) and is tasteless. Some other liquids like kerosene, fruit juice and edible oils have colour, smell and taste.

At atmospheric pressure, pure water:

- freezes at 0 °C.
- is neutral to litmus.
- boils at 100 °C.
- has a maximum density of 1g/cm<sup>3</sup> at 4 °C.
- is a poor conductor of electricity (but becomes a good conductor when a small amount of an ionic compound is dissolved in it).
- expands between 4 °C and 0 °C and contracts (becomes less in volume) when melting from 0 °C to 4 °C so usually, solid water (ice) floats on liquid water.
- has a high surface tension so that it appears to form a strong skin on its surface.

Water is capable of dissolving many substances and it is therefore referred to as a **universal solvent**.

**NB:** Dissolved solids, such as salt and sugar raise the boiling point and lower the freezing point of pure water.

#### 4. The Use of Chalkboard

Samples of layouts of chalkboard writing are shown below.

##### Sample A

<p>23rd/June/06 Water and other liquids Characteristics of water and other liquids.</p> <p>Experiment Title: Activity 2 Which liquid pours more easily?</p> <p>Aim: To find out which liquid flows faster or more slowly.</p> <p>Apparatus: Water, cooking oil, plastic bottles, ruler, marker, stopwatch, funnels.</p>	<p>Method: Obtain two identical plastic bottles and place a funnel on each. Mark each bottle equally. Measure some water and pour it into one of the bottles through the funnel. Time it and check how long it takes to reach the mark. Repeat the activity with the cooking oil. Copy and complete the table:</p> <p>Observation:</p> <table border="1" data-bbox="772 790 1422 1013"><thead><tr><th>Liquid</th><th>How long does it take to reach the mark?</th><th>Does it flow fast or slowly?</th></tr></thead><tbody><tr><td>Water</td><td></td><td></td></tr><tr><td>Cooking Oil</td><td></td><td></td></tr></tbody></table>	Liquid	How long does it take to reach the mark?	Does it flow fast or slowly?	Water			Cooking Oil			<p>Conclusion</p> <p>Conclusion/ today's summary</p> <p>Pure water is colourless, odourless and tasteless. Cooking oil flows more slowly than water</p> <p>Exercise</p>
Liquid	How long does it take to reach the mark?	Does it flow fast or slowly?									
Water											
Cooking Oil											

Divide the chalkboard into four sections, showing clear differences in sections of the experiment

**Sample B**

23<sup>rd</sup>/June/06

Water and other Liquids (-> Title)

2). Characteristics of water and other liquids

**Activity 1:** Comparing some liquids (-> Title of activity)

Materials: water, kerosene, orange juice, cooking oil, (transparent) bottles (-> Resources of the activity)

(-> Result of the activity)

Water and other liquids are different. They smell differently. Their

Liquid	Colour	Smell	Texture
Water	Colourless	No smell	Thin
Kerosene	Colourless	Has smell	Thin
Orange juice	Orange	Has smell	Thin
Cooking oil	Has colour	Has smell	Thick

colours are different. Their texture (feel) is different.  
Some liquids flow more slowly than others.  
Pure water is colourless, odourless and tasteless.

**Activity 2: Which liquid pours more easily?**

(-> Title of activity)

**Materials:** Water, cooking oil, plastic bottles, ruler, marker, stopwatch, funnels.

**Procedure:**

Obtain two identical plastic bottles and place a funnel at the mouth of each.

Mark each bottle equally.

Measure some water and put into one of the bottles through the funnel.

Time how long it takes to reach the mark.

Repeat the activity with the cooking oil (palm oil).

**Result:**

Conclusion/ today's summary

Pure water is colourless, odourless and tasteless.

Cooking oil flows more slowly than water

Liquid	How long does it take to reach the mark	Does it flow faster or slowly?
Water		
Cooking Oil (Palm oil)		

**Conclusion**

**Conclusion/today's summary**

Pure water is colourless, odourless and tasteless.

Water flows faster than cooking oil (palm oil).

**Exercise**

5. English as a Teaching Tool

(a) The text in this lesson may be quite difficult for the pupils to read with understanding. If this is so, prepare a simplified version to write on the blackboard for the pupils to read and to copy into their exercise books. For example the first page can be re-written as follows:

Water and other liquids are different. They smell differently. Their colours are different. Their texture (feel) is different. The activities in this lesson show how the liquids are different. You will need some different liquids – kerosene, palm oil and engine oil.

Write the name of each liquid in the first column.

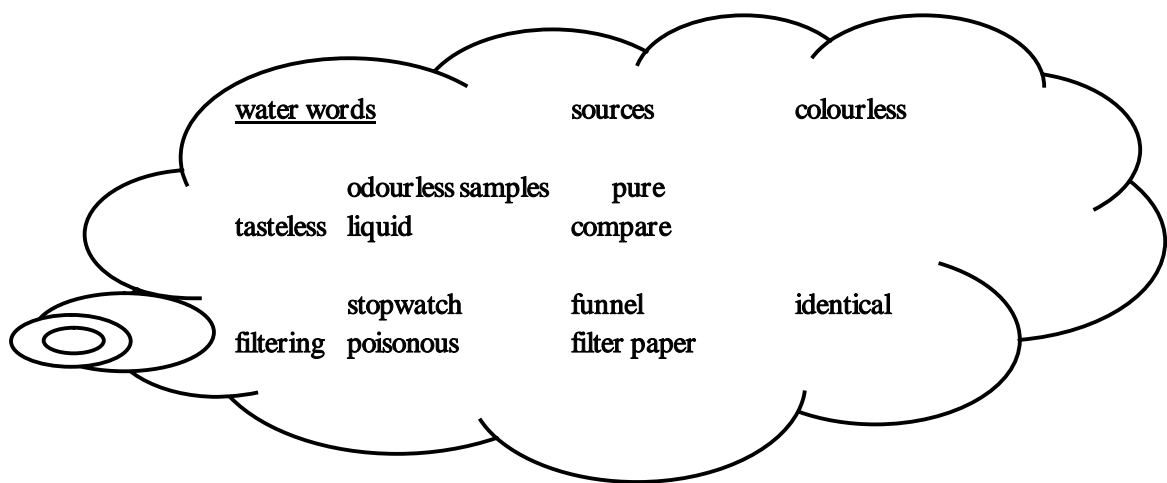
Make a class chart as shown:

Liquid	Does it have colour?	Does it have smell?	Does it have taste?	What is the texture? Is it thick or thin?

If the pupils’ standard of English is good the teacher can introduce the new vocabulary linked to vocabulary the pupils have already learned. For example:

- odourless means no smell
- tasteless means no taste
- identical means the same

(b) A simple definition of the vocabulary “thick” and “thin” is given in the pupils’ book as “thick liquids flow or fill more slowly than thin liquids”. The teacher will have to discuss this concept with the pupils after they have observed the experiment because they will already be familiar with the use of this vocabulary in the context of thickness and thinness of a book or a slice of bread, for example.



## Sample Lesson Plans (TYPE B)

### Lesson 3: Rusting (Primary 6)

1. Lesson plan
2. English as a teaching tool

### Lesson 4: Production of Sound (Primary 6)

1. Lesson plan
2. English as a teaching tool

### Lesson 5: Properties of Air (Primary 4)

1. Lesson plan
2. English as a teaching tool

Lesson 3: Primary 6

Rusting (Characteristics of Metals and Non-metals)

1. Lesson Plan

**SUBJECT:** Science  
**CLASS:** Primary 6

**REFERENCES:** 1. Primary School Integrated Science Syllabus pg 68-69  
**Details about the Class:** Some pupils have done woodwork and they are familiar with rusted nails and new nails

DAY/DATE/TIME/DURATION	TOPIC/SUB-TOPIC	OBJECTIVES/R.P.K.	TEACHING/LEARNING MATERIALS TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/ EXERCISE
19/MAY/04  THURSDAY 8:00 ~ 30 MINUTES	<b>TOPIC:</b> KINDS OF METALS  <b>SUB-TOPIC:</b> RUSTING	<b>OBJECTIVES:</b> By the end of the lesson, a pupil will be able to: 1. mention four examples of rusty objects in the environment, 2. describe the process of rusting by an experiment, 3. state at least two ways of preventing rusting.	<b>TLMs:</b> Iron nails, steel wool, water, oil, salt, lemon juice or vinegar, jars, rusty nails and rusty steel wool.  <b>INTRODUCTION:</b> Let pupils tell the difference in the colour of new and old roofing sheets.  <b>ACTIVITY:</b> – Pupils observe the clean nails and steel wool and then predict what will happen if these things are left in an open place for about one week. – Pupils examine the old nails and steel wool for any observable changes in colour and texture. Compare them to the clean ones. – Pupils give examples of other materials, which look like the old nails in the environment. – Pupils verify their predictions by finding out what makes iron and steel look old and brownish in colour by performing an experiment using the procedure below.	<b>CORE POINT 1:</b> New roofing sheets look silvery and old ones look reddish-brown.  <b>CORE POINT 2:</b> The nails will change colour. The nails and steel wool will become dirty and old. The clean nails have their original colour and texture whilst the old nails and steel wool have changed to a brownish and their surfaces have become rough. Examples of objects are: old vehicles, spoons, some earrings, wires, iron rods coal pots etc	<b>ORAL QUESTIONS:</b> 1. Mention 3 examples of metallic objects. 2. What will happen if you leave clean nails outside the classroom for three days? 3. State three differences between the rusty nails and the new ones.



Continued from the previous page.


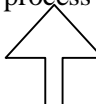
DAY/DATE/TIME/ DURATION	TOPIC/ SUB-TOPIC	OBJECTIVES /R.P.K	TEACHING/LEARNING MATERIALS TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/ EXERCISE																					
<p>Observation of the experiment after a week</p>		<p><b>R.P.K.:</b></p> <p>Pupils have seen old roofing sheets that have changed colour to brown.</p>	<p><b>PROCEDURE:</b></p> <ol style="list-style-type: none"> <li>1. Pour the same amount of cooled boiled water, oil, vinegar, salt solution and ordinary water into each of the five jars. Leave one jar dry.</li> <li>2. Put some new iron nails and some new steel wool into all the six jars.</li> <li>3. Leave the set up for about one week or more.</li> <li>4. Observe the nails and the steel wool for one week and record any changes in colour.</li> <li>5. Record your observations in a table like the one below. <table border="1" data-bbox="801 683 1487 909"> <thead> <tr> <th>Jar</th> <th>Steel wool</th> <th>Iron nail</th> </tr> </thead> <tbody> <tr> <td>Dry</td> <td></td> <td></td> </tr> <tr> <td>Ordinary water</td> <td></td> <td></td> </tr> <tr> <td>Vinegar/ lemon juice</td> <td></td> <td></td> </tr> <tr> <td>Oil</td> <td></td> <td></td> </tr> <tr> <td>Salt solution</td> <td></td> <td></td> </tr> <tr> <td>Cooled boiled water</td> <td></td> <td></td> </tr> </tbody> </table> </li> <li>6. Leave the set-up of the experiment for further discussion after one week.</li> </ol> <p><b>After a week:</b></p> <ul style="list-style-type: none"> <li>- Pupils record the results of their observations in a table.</li> <li>- Teacher and pupils discuss the process of rusting using the rusty nails and steel wool as examples.</li> <li>- Teacher and pupils discuss two ways of preventing rusting.</li> </ul>	Jar	Steel wool	Iron nail	Dry			Ordinary water			Vinegar/ lemon juice			Oil			Salt solution			Cooled boiled water			<p><b>CORE POINT 3:</b></p> <p>Rusting is a chemical reaction. It occurs on surfaces of metals. It normally occurs when air and water act on a metal for example iron and wears it off to produce a reddish-brown coating known as rust.</p> <p>Painting and oiling can prevent rusting.</p>	<p>List four examples of objects that are in similar condition like the rusty nails.</p>
Jar	Steel wool	Iron nail																								
Dry																										
Ordinary water																										
Vinegar/ lemon juice																										
Oil																										
Salt solution																										
Cooled boiled water																										

## 2. English as a Teaching Tool

(a) At the beginning of the lesson the pupils are asked to predict what will happen to nails and steel wool if they are left in the open. The pupils can work in groups (eg. of 4) to discuss their ideas. Each group can explain their prediction to the class. Then they observe the changes in some old nails and steel wool. The pupils may have difficulty explaining their ideas in English. It is important for the teacher to encourage them and give them confidence to try to use their own words. Some pupils will find it helpful to be prompted or to answer a question, which the teacher provides them with some clues. Also, if the teacher needs to correct the pupil she can do so by repeating the pupil's incorrect sentence in the correct form rather than discouraging the pupil by saying she is wrong. For example:

Ask the pupils to work in groups of 3-4 in which there is a child who is better in English is in each group.

Write some questions based on The Rusty Nail Experiment on the blackboard and ask each group to read out one question.

Chalkboard	
<p><u>Activity 1</u>                  What is likely to happen to the nails?                  What is likely to happen to the steel wool?</p> <p><u>Activity 2</u>                  What did you observe?                  What happened to the nails?                  What happened to the steel wool?</p> <p>Have you seen any rusty metal in the village?</p>	<p>iron nails</p> <p>steel wool machinery roof</p> 
	<p>rusty red colour</p> <p>air water process</p> 
<p>Ask the pupils to think of some words to write on the Chalkboard as a vocabulary list to help them answer the questions about the rusty nail experiment.</p>	

(b) You can use a similar method as above to help the pupils complete the tasks in the text book.

Chalkboard		
What advice will you give your parents and friends to prevent the rusting of iron buckets at home? How can you prevent rusting? Can you use paint, oil or grease to prevent rusting? What is an alloy? How can zinc be used to stop rusting?	paint painting air water mixed	alloy coating iron based

Ask the pupils to think of some words to write on the blackboard as a vocabulary list to help them answer the questions about the how to prevent rusting.

(c) The review questions provide a good opportunity for the teacher and pupils to revise and practise the English vocabulary they have learned. Pupils can complete the exercises orally and can write them in their exercise books.

**NOTE FOR TEACHERS:** The methodology described for this topic can be modified to correspond with the concepts and vocabulary of many other Science lessons.

**Lesson 4: Primary 6**

**Production of Sound (Energy)**

1. Lesson Plan

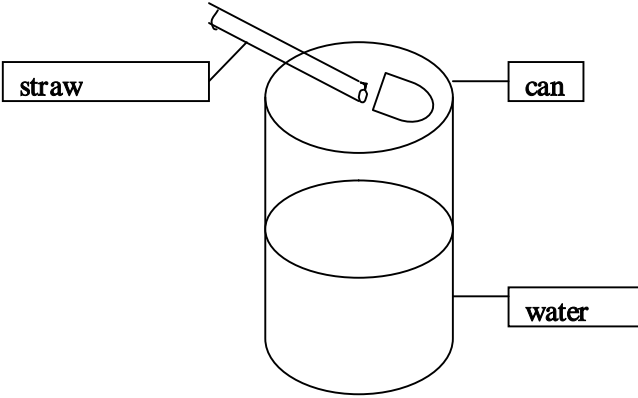
**SUBJECT:** Integrated Science

**REFERENCE:** 1. Primary School Integrated Science Syllabus pg 63

**CLASS:** Primary 6

**DETAILS ABOUT THE CLASS:** Although Primary 4 Science has already dealt with the fact that sound is produced when particles vibrate, not many pupils have a good understanding of that.

DAY/DATE/TIME /DURATION	TOPIC/ SUB-TOPIC	OBJECTIVE (S)/ R.P.K.	TEACHING/LEARNING MATERIALS TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/EXERCISE REMARKS
Thursday  26 <sup>TH</sup> OF AUG  9:00 ~  60 minutes	Section 5  Unit 6  <b>TOPIC:</b>  Production of Sound    <b>SUB- TOPIC:</b>  Measurement of length	<b>OBJECTIVES:</b>  By the end of the lesson, the pupil will be able to;          - demonstrate how sound is produced by vibration,  - identify materials that can vibrate,  - compare the differences in sound produced such as, high pitched sound, low pitched sound, quality of sound, and noise.	<b>T.L.M.s:</b> empty bottles (etc soft drinks), drinking straws, metal spoons   <b>INTRODUCTION:</b>  “What kind of music do you like?” “Do you know how musical instruments produce/make sound?” “What we are going to learn about today is how sound is produced.”   <b>ACTIVITY 1:</b>  Pupils place rulers at the edges of the tables and tap the free end.  T) “Can you hear any sound from the rulers?” “What is making the sound?” “How do you describe the movement of the ruler?”	          <b>CORE POINT 1:</b>  Rapid movement of an object back and forth is called vibration. Vibration makes sound.	Exe.  1. Use the following words to complete the sentences below: soft, loud, instrument, bottles, objects, water, different, vibrating objects.  a) Different ( ) make ( ) sounds.  b) Some sounds are ( ) than ( ), others are ( ).  d) Sound is produced by ( ).

DAY/DATE/TIME /DURATION	TOPIC/ SUB-TOPIC	OBJECTIVE (S)/ R.P.K.	TEACHING/LEARNING MATERIALS TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/EXERCISE REMARKS									
		<p>R.P.K.:</p> <p>Sound is produced when particles of matter vibrate. The degree of sound depends on the strength with which the matter is caused to vibrate. (From Primary 4)</p>	<p><b>ACTIVITY 2:</b></p> <p>The use of bottle /can as musical instruments.</p> <p>Put different amounts of water in empty bottles/cans.</p> <p><b>Part 1:</b> Hit each bottle/can with a metal spoon and listen carefully to the sound each bottle makes.</p> <p><b>Part 2:</b> Put a straw near the mouth of the bottles or cans, blow some air into the can through the straw, and adjust the position of the straw so that it makes sound.</p>  <table border="1" data-bbox="846 981 1317 1145"> <thead> <tr> <th>Amount of water in the bottle</th> <th>Pitch of the sound made by hitting</th> <th>Pitch of the sound made by blowing</th> </tr> </thead> <tbody> <tr> <td>Large</td> <td>High/Low</td> <td>High/Low</td> </tr> <tr> <td>Small</td> <td>High/Low</td> <td>High/Low</td> </tr> </tbody> </table> <p>T)’ Which bottle makes high pitched sound by hitting (blowing)?’</p> <p>Teacher tells pupils to fill in the table.</p> <p><b>CLOSURE:</b></p> <p>The teacher lists up the core points of the lesson on the board through a short Q and A.</p>	Amount of water in the bottle	Pitch of the sound made by hitting	Pitch of the sound made by blowing	Large	High/Low	High/Low	Small	High/Low	High/Low	<p><b>CORE POINT 2:</b></p> <p>When the amounts of water in the bottles/cans are not the same, the pitch of the sound produced is different, too.</p> <p>The smaller the amount of water, the lower the pitch becomes. The larger the amount of water, the higher the pitch becomes.</p>	<p>3. How do you make high pitch sound using empty bottles and water?</p>
Amount of water in the bottle	Pitch of the sound made by hitting	Pitch of the sound made by blowing												
Large	High/Low	High/Low												
Small	High/Low	High/Low												

## 2. English as a Teaching Tool

(a) This lesson gives the pupils the practical experience of hearing sounds of different kinds and learning how the sounds are made. After completing the sound experiments the teacher completes a table of the results on the blackboard. The teacher should follow the steps below to make best use of the blackboard as a teaching and learning resource. This will also help the pupils to understand how to complete a table of results.

1. Tell the pupils, ‘we are going to make a table of the results of the experiment’.
2. Give the table a title: Production of Sound Experiment.
3. Draw the table and write the heading in the first column: Amount of water in the bottle.
4. Hold up the bottle that made the highest pitch sound and the bottle that made the lowest pitch sound. Ask the pupils to describe how much water was in the two different bottles.

Write “more water” and “less water” in the first column.

5. Write the headings in the second and third columns, reminding the pupils that these were the different ways they made sound from the bottles.
6. Explain to the pupils that they are going to complete the other spaces in the table.
7. Point to the first empty space and ask the pupils to say which result we put there.
8. The answer is “The pitch of the sound made by hitting the bottle that contained more water.”

Answer: The pitch of the sound made by hitting the bottle that has more water.

Point to the first empty space and ask the pupils to say which result we put here.

<b>Production of Sound Experiment</b>		
<b>Amount of water in each bottle</b>	<b>Pitch of the sound made by hitting the bottle</b>	<b>Pitch of the sound made by blowing</b>
<b>More water</b>	High / Low	High / Low
<b>Less water</b>	High / Low	High / Low

9. Ask the pupils to listen again to the sound made by each bottle and say whether the pitch of the sound made by hitting the bottle that has more water is high or low
10. Repeat points 7 and 8 for each of the other spaces to complete the table.

## Lesson 5: Primary 4

## Properties of Air

### 1. Lesson Plan

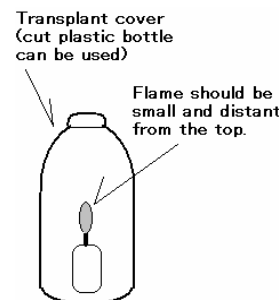
**SUBJECT:** Integrated Science

**REFERENCES:** 1. Primary School Integrated Science Syllabus pg 12

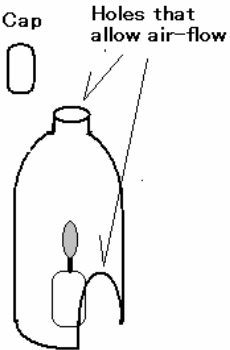
**CLASS:** Primary 4

**DETAILS ABOUT THE CLASS:** (Example) Almost all pupils have used coal pots for cooking and know how to make the fire hotter although many of them do not know the reasons.

DAY/DATE/TIME/ DURATION	TOPIC/ SUB-TOPIC	R.P.K/ OBJECTIVES	TEACHING/LEARNING MATERIALS TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/ EXERCISE
THURSDAY 3 <sup>rd</sup> of May  11:00 ~  6 0 MINS	<b>TOPIC:</b> Air  <b>SUB-TOPIC:</b> Properties of air	<b>OBJECTIVES:</b>  By the end of the lesson, a pupil will be able to:  Show how air supports burning.  <b>R.P.K.:</b>  Air is around us but cannot be seen. It occupies space and has weight.  Air can hold things up.  Air causes leaves on plants to move.	<b>TLMs:</b> A fan, a coal pot, charcoal, small and short candles, transparent covers (cut plastic bottles etc.)  <b>INTRODUCTION:</b> The teacher starts the lesson with questions that relate the topic to real life. For example, “When you want to cook fast using a coal pot, what would you do to make the fire hotter?”  <b>ACTIVITY 1:</b> The teacher shows a burning candle to the pupils.  The teacher asks how they can keep the candle burning and also how they can stop it from burning.  In order to present the fact that air supports burning, the teacher limits the flow of air for burning a candle by putting a transparent cover over a burning candle.  The teacher can ask the following questions:  “What would happen to the candle when we cover it?”, “Why did the burning candle go off?”  <b>Safety:</b> This activity should be a teacher’s demonstration, not pupils’ hands-on activity. The plastic bottle can get dangerously hot and melt when the flame is too high or too close to the top of the bottle.	<b>CORE POINT 1:</b> Air supports burning.	<b>EXERCISE:</b> Fill in the gaps below with the right words.  Q1. Air supports ( ).



Continued from the previous page.

DAY/DATE/TIME/DURATION	TOPIC/ SUB-TOPIC	R.P.K/ OBJECTIVES	TEACHING/LEARNING MATERIALS TEACHER/LEARNER ACTIVITIES	CORE POINTS	EVALUATION/ EXERCISE
	<p><b>TOPIC:</b> Air</p> <p><b>SUB-TOPIC:</b> Properties of air</p>	<p><b>OBJECTIVES:</b> By the end of the lesson, a pupil will be able to:</p> <p>Show how air supports burning.</p> <p><b>R.P.K.:</b> Air is around us but cannot be seen. It occupies space and has weight. Air can hold things up. Air causes leaves on plants to move.</p>	<p><b>ACTIVITY 2:</b> As shown in the figure below, the teacher puts a transparent cover with holes</p>  <p>After the pupils observe that the candle continues burning, the teacher can ask the following questions. Note: the questions and their sequence must be carefully organised so that the pupils can find out the core point for Activity 2 by themselves. Examples of questions are below.</p> <p>“What made the candle continue burning?” (Possible answers: air, holes, air-flow, etc...) “Why do we need holes to let the candle keep burning?” (Possible answers: getting air, air-flow, getting rid of air, etc...)</p> <p><b>Alternatively,</b> before conducting the experiment, the teacher can ask the pupils what would happen to the burning candle, leading pupils to make an assumption or hypothesis.</p> <p><b>ACTIVITY 3:</b> The teacher demonstrates fanning a coal pot to make the fire hotter. This can be done outside the classroom, considering safety. The pupils should be encouraged to compare the results of Activities 2 and 3, focusing on the supply of air.</p> <p><b>SUMMARY:</b> The teacher lists up the core points of the lesson on the board through a short Q and A. The teacher leads a discussion with the pupils with the aim of making them discover that the core points they learnt in the lesson are very relevant to their everyday life.</p>	<p><b>CORE POINT 2:</b> Supply of air or air-flow is needed for continuous burning.</p> <p>Fanning fire increases the supply of air. Increased supply of air makes the fire brighter and stronger.</p>	<p><b>EXERCISE:</b></p> <p>Q2. Supply of ( ) is needed for a candle to keep burning.</p> <p>Q3. How would you make the flame of a coal pot stronger?</p> <p>Q4. Explain why fire is brighter/hotter when we fan a coal pot.</p>



## 2. English as a Teaching Tool

(a) In the first part of this lesson the teacher may simplify the English language used by saying “air helps charcoal to burn” or “air helps the flame of the candle to burn”. Later in the lesson the teacher should use the correct expression “air supports burning” so that the pupils become familiar with the standard expression which is used in the pupils’ book.

Irregular Vocabulary plural of “charcoal” is “charcoal”  
E.g. Put some more charcoal in the charcoal pot.

Irregular spelling fan - fanning stop - stopped

(b) During the part of the lesson when the teacher conducts the experiment she should encourage the pupils to use full sentence construction to explain their ideas and to use higher order thinking. For example:

Qu. Why did this candle continue burning but this candle stopped burning?

Ans. This candle continued to burn because it had air. So it had a fresh supply of oxygen.  
This candle stopped burning because there was no fresh air. The flame needs oxygen to continue burning”

(c) At the end of the lesson the teacher can help the pupils to review the concept and to practise their English at the same time by giving a simple exercise as in the pupils’ book.

The exercise can be given: orally or  
as a written exercise or  
the exercise can be written first and then checked orally or  
practised orally and then recorded in writing.

The multiple choice format helps the pupils by giving them the correct sentence structure and spelling.