ENGLISH FOR TEACHING MATHEMATICS AND SCIENCE (ETeMS)
PHASE 1

MODULE 2
PRIMARY

NGLISH FOR THE TEACHING OF MATHEMATICS AND SCIENCE (ETeMS)

ENGLISH LANGUAGE TEACHING CENTRE, MALAYSIA
BAHAGIAN PENDIDIKAN GURU
KEMENTERIAN PENDIDIKAN MALAYSIA

AIM

The overall aim of ETeMS is to enhance the English language skills of Mathematics and Science teachers to enable them to teach effectively using English as the medium of instruction.

Structure of the ETeMS Programme

ETeMS involves 240 hours of instruction delivered through face-to-face interaction and self-instructional packages. These will be supported by a 'buddy system' whereby the teachers can get further help from identified resource persons in their locality.

The ETeMS programme is conducted in 2 phases. Each phase comprises 90 hours of face-to--face interaction and 30 hours worth of self-instructional materials.

Phase 1 will be delivered through

- 5 modules spread over 5 weeks. Each module requires 2 days of face-to-face interaction (60 hours)
  5-day Module (30 hours)
- a self-instructional package (30 hours)

Module Content

Each two-day module consists of a series of sessions covering a total of 12 hours of interaction. The duration of each session is between 1 to 3 hours. The components for the various sessions are shown in the table below.

SESSION	COMPONENT
Text Lab	Interfacing with Text Word Explorer Connecting with Text Language in Action Springboard
Language Lab	Grammar Works Getting it Right Trying it Out
Stand and Deliver	
Back to the Future	

PHASE 1

MODULE 2

PRIMARY

CONTENTS

ENGLISH FOR TEACHING MATHEMATICS AND SCIENCE

TEXT LAB

INTERFACING WITH THE TEXT

Below is a text about maths explaining fractions and decimals entitled *Fracrions and Dedinals. The text is taken from a book byAbdulaziz and Stover Who'do you think this text will benefit most?*

Fractions and Decimals

Fractions and decimals are important parts of math. We use words like 'half' and "quarter" every day. In fact, we call the 25 coin a quarter. Fractions are often used to measure things in cooking, sewing, and carpentry. Decimals are often used with money. It is important to use the decimal point when you write checks. Decimals and fractions are important parts of math that every person uses every day.

A fraction is one way of writing a division problem. Three-fourths means three divided by four: 3/4 or 3 ÷ 4. All fractions have two parts. In the fraction a/b, *a* is the *numerator,* and *b* is the *denominator.* When we read a fraction, we add *th* to the denominator. For example, we say "one-fourth" for 1/4, and "one-twelfth" for 1/12, and "seven-sixteenths" for 7/16. But, for 1/2 we say "one-half," and for 2/3 we say "two-thirds."

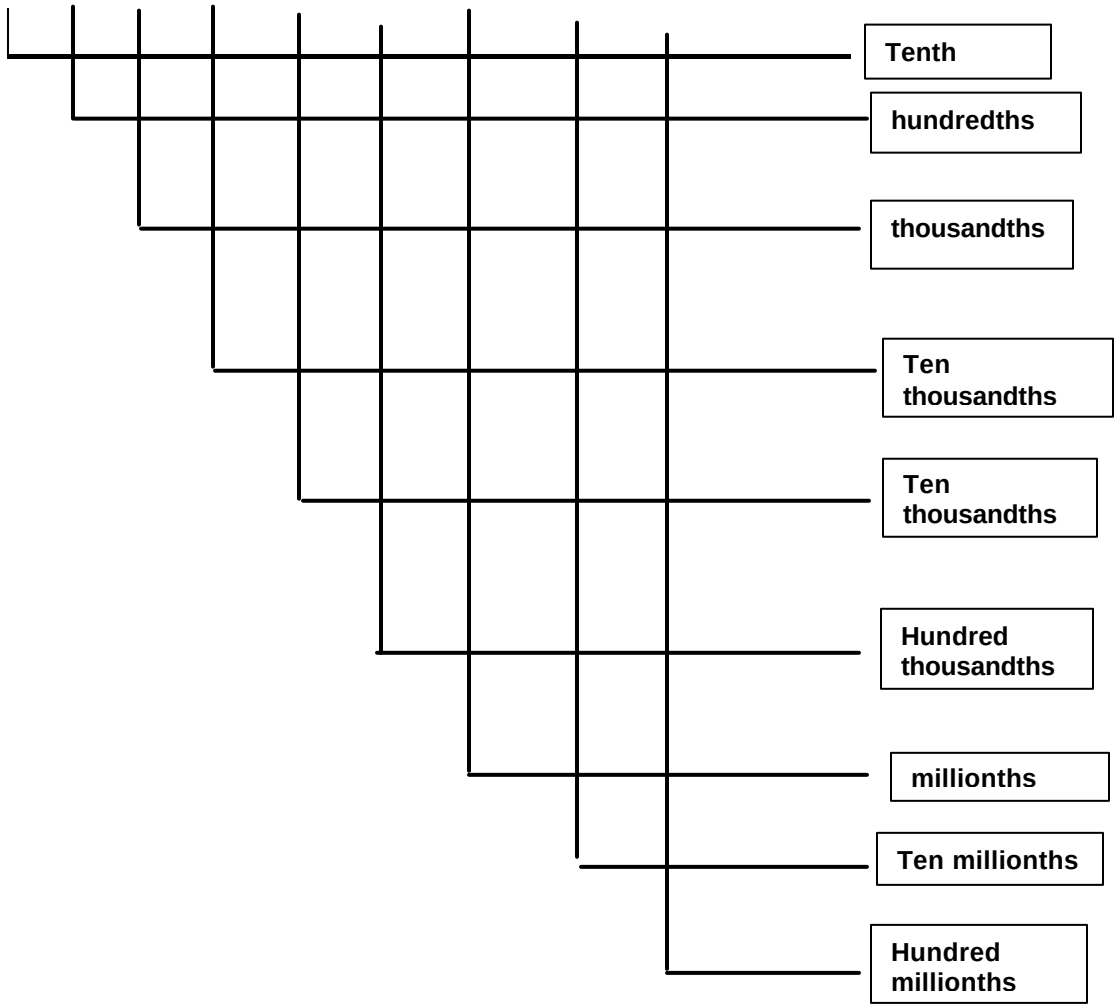
Two fractions with the same value are equivalent. One-fifth is equivalent to five twenty-fifths, which is equivalent to twenty-hundredths (1/5= 5/25 = 20/100). One-fifth is a **simplified** fraction.

We can do the four mathematical operations with fractions, too. Before you can add and subtract fractions, you must make all the denominators the same. If all the fractions have the same denominator, you can add and subtract them.

To multiply or divide two fractions, the denominators do not have to be the same. To multiply fractions, you can simply multiply the two denominators and the two numerators. To divide fractions, you must first invert the denominator of one fraction by turning it over. After that, you can multiply the two fractions.

Decimals are another way to write fractions. Many fractions such as one-fourth or four-fifths have exact decimal equivalents: 1/4 = .25 and 4/5 = .8. However, not all fractions have exact decimal equivalents. For example, one-third (1/3) equals .33333.

Decimal numbers have decima/points(.). The names of the places, or digits, to the right of the decimal point are similar to the names of the digits on the left of the decimal point, but like fractions, they have that the end. Look at the names below.



We read .4 as four-tenths and .06 as six-hundredths. Four-tenths is a one-place decimal, and six hundredths is a two-place decimal. The number.138752 35 is a six-place decimal. We usually read long decimal numbers like this: 'point one three eight seven five two."

Decimal numbers sometimes have many places. It is often necessary to shorten them. To make a decimal number short, you may **round** it off. For, example, round off .78 to .8 or round off .72 to .7 or round off .75 to .8, but round off .65 to .6.

Decimal numbers are easy to add, subtract, multiply, and divide. To add and subtract decimals, it is not necessary to think about the denominator. You can add, subtract, and multiply decimals the same as whole numbers, but be careful of the decimal point!

In summary, a fraction is a part of a whole number. It is another way of writing a division problem. Decimals are another way to write fractions. Decimal numbers use a decimal point. Decimal numbers are sometimes easier than fractions. Fractions and decimals are like integers because they are negative and positive, and you can do the four basic mathematical operations with them. Both decimals and fractions are basic to mathematics, but we use them every day at the bank, at the grocery store, at work, and at home and when we shop, cook or build something.

Source: Academic Challenges In Reading. AbdulAziz & Stover. Prentice Hall. 1989

WORD EXPLORER

TASK 1 *vocabulary*

Scan the text and list the English equivalent to the Bahasa Melayu terms listed below.

Check with a partner Are there other words that you need to clarify? Add them to the fist as you discuss with your partner.

Bahasa Melayu term	***English euivalent***
pecahan	
Perpuluhan	
Penyebut	
Pengangka	
Darab	
Bahagi	
Titik	
Setara	
Tolak	
Songsangkan	
Digit	
Tambah	
Bundarkan	
integer	

CONNECTING WITH TEXT

TASK 2 *Wh-questions*

Refer to the text above and attempt the following questions.

1. What is a denominator?
2. How do we read a fraction?
3. What are 'the four mathematical operations' referred to in line 16?
4. Why did the writer use the word 'too' in line 16?
5. What does the phrase 'round it off' in lines 38 and 39 mean?
6. How are decimal numbers different from fractions?
7. The word `exact' in line 26 can be replaced by _____ .
8. Why is a fraction defined as one way of writing a division problem?
9. Why does the writer end the second paragraph on page 3 with 'but be careful of the decimal point!' (lines 43-44)?
10. How does maths impact everyday life?

LANGUAGE IN ACTION

TASK 3 Models

Read the paragraph beginning with line 20. Underline the words` can' and 'must' as they appear in the paragraph. Explain what they mean.

can in line 21 means .....

must in line 22 means .. ..

As a teacher think of some things you will be required to do to teach MathslScience in English. What are some things you can do? Are there other things you must do and others that you may do? List them down. Organize your information.

Can do	***Must do***	***May do***

TASK 4

Conjunctions

Certain words and phrases create logical connections between ideas either within a sentence or between sentences in a text. Conjunctions are one such group of words.
What are conjunctions?

- Conjunctions are words and phrases which **join clauses into sentences.** *I went home early **because** I was extremely tired.*
- Conjunctions also show how the meanings of the two clauses are related.

  *Food **and** drink were given free. (addition)*

  *He was old **but** he could outrun the younger men. (contrast)*

  *He failed in his test **because** he could not complete it. (cause)*

  *She called me **when** she arrived. (dine)*
  *We could stay in **or** go out for a meal. (altemative)*

Source: Practical English Usage. Michael Swan.
Oxford University Press. 1995.

A number of conjunctions used in the text are listed in the table below. For each item listed, indicate its function and the two ideas that it links The first one is done for you.

Conjunctions	***Function***	***Idea***	***Idea***
and (line 1)	addition	fractions	decimals
When (line 9)			
But (line 11)			
which (line 14)			
if (line 18)			
or (line 20)			
and (line 22)			
that (line 23)			

SPRINGBOARD

According to a noted Maths educator Marlyn Burns:
"Writing has a place in math only if it stimulates the children to think and reason "

Burns provides two strategies for getting your students to do just that.

1. When teaching number concepts, focus on problems that require written responses, not just numerical answers.
2. Use word problems that get students reasoning as well as finding answers.

(a) How will you answer the following problem? Record your solution along with an explanation of how you solved the problem.

A farmer had five cows and four chickens in a field. He wondered how many feet and tails there were altogether.

(b) Using the two strategies provided by Burns create a word problem to teach Maths.

Source: *Mathematics as a way of doing.* Susan Ghanian. Stenhouse Publishers. 1995

A farmer had five cows and four chickens in a field. He wondered how many feet and tails there were altogether.

LANGUAGE LAB 1

GRAMMAR WORKS

" The Greek philosopher Plato once defined man as a two-legged creature that has no feathers. His critic Diogenes left the room and brought back a bird without feathers, declaring, ``Here is Plato's man!

What was the problem with Plato s definition? What are the characteristics of a goad definition?

INTRODUCTION

A definition answers the question, "What is it?" A definition should be complete enough to include all the items in the category yet narrow enough to eliminate items that do not belong.

Scientists and mathematicians depend on precise definitions of substances, concepts, processes, and ideas in their work. Sometimes a definition is necessary because a word or concept has more than one meaning. For example, whether carbon is a metal or non-metal depends on how you define carbon. At other times, a definition is required because a term is being used in a special way. For example, physicists use the terms work and energy in ways that are more specific than their common meanings.

It is also important for a mathematics or science teacher to be able to give clear and precise definitions when explaining concepts and ideas to her students.

Task 1 Looking at Definitions

The text below contains a *number* of definitions *First, read the* text and *underline all the definitions. Then, try to categorize the definitions that you have identified according to the sentence patterns used.*

The Many Forms of Energy

Energy is the ability to do work. When a hammer strikes a nail, it exerts a force on the nail that causes it to move. The movement of the hammer has the ability to do work and therefore has a form of energy that we call kinetic energy. Kinetic energy is the energy of motion.

An object may have energy not only because of its motion but also because of its position or shape. For example, when a watch spring is wound, it is storing energy. When this energy is released, it will do the work of moving the hands of the watch. This form of energy is called potential energy. Potential energy is stored energy. Water in a dam is another example of potential energy.

There are many types of kinetic and potential energy, including chemical, thermal, mechanical, electrical, and nuclear energy. Chemical energy is potential energy that is stored in gasoline, food, and oil. Just as the watch spring needs to be released to do the work of moving the hands, the energy stored in food molecules needs to be released by enzymes or substances in the body, and the energy stored in gasoline must be released by the spark plug to do its work of propelling the car forward. Thermal energy is the kinetic energy of molecules. When a substance is heated, the molecules move faster. This causes that substance to feel hot. Mechanical energy is energy that is related to the movement of objects. Electric energy is energy that is produced by electric charges. Nuclear energy is the energy that is stored in the nucleus of certain kinds of atoms, like uranium.

Source: Zimmerman, F. 1989. *English for Science* Englewood Cliffs, NJ: Prentice Hall

Task 2 Relative clauses

In the previous activity, we saw that two different sentence patterns are very often used for making definitions. One of these patterns makes use of relative clauses to give further distinguishing characteristics of the concept.

Example:
A computerris an electronic device which/that processes information.

A relative clause begins with *which, that, where, or who. Which* and *that* are most commonly used in science definitions; who is used when referring to people. In a definition, the relative clause either contains the characteristics that distinguish an item from others in the class or gives additional information about the item being defined.

Combine each of the following pairs of sentences to produce a one-sentence definition with a relative clause.

a. Protons are positively charged particles. They are contained in the nucleus of an atom.

Proton are positively charged particles that are contained in he nucleus of an atom.

b. Nitrogen makes up 80 percent of the air. It is a colourless, odourless gas.

_____

_____

c. Marine biologists are scientists. They study animals and plants that live in the sea.

_____

_____

d. The stratosphere is a portion of the atmosphere. It is over seven miles above the Earth.

_____

_____

e. Insulin is used in the treatment of diabetes. It is a hormone.

_____

f. Bacteria can sometimes cause diseases. They are simple forms of plant life.

_____

g. Oxidation is a chemical reaction. It involves the loss of one or more electrons by an atom or ion.

_____

h. A black hole is an area in space. It has a gravitational pull so powerful that nothing, not even light, can escape.

_____

_____

Task 3 The Simple Present Tense

The simple present tense is used to express general statements of fact. We normally use the simple present tense when providing maths and science definitions and explanations because they deal with facts. An example is provided in the box below. Look at the verb forms in this text. Now look at the text on page 2. Are similar verbs forms also used?

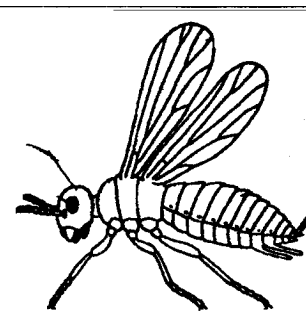
A hibiscus is a flowering plant. All flowering plants **are composed** of four organs – roots, stems, leaves and flowers. The central part of the plant is the stem.

A hibiscus is a flowering plant. All flowering plants **are composed** of four organs – roots, stems, leaves and flowers. The central part of the plant is the stem.

Use the simple present tense form of the words provided in brackets to complete each of the texts below.

INSECT ANATOMY

The body of an insect (consist**) of three main parts: the head, the thorax and the abdomen. The head (**contain**) the insect's brain, eyes and mouth. It also (**carry**) the antennae. The thorax (**be**) the central part of the body. It (**bear**) the legs and wings. There (**be**) three pairs of legs and two pairs of wings. The insect's abdomen (**contain**) its digestive and reproductive organs.**



THE SUN

The sun (be) a star **and (made)** up of hot gases. It (be) nearly 150 million kilometer from earth.

Solar **energy (produce) in the central core of the** sun. The surface of the sun (call) the photosphere. On the surface the temperature (be) about 6000°C. Below the surface the temperature (be) about 35 million degrees centigrade. The thin **layer of gas above the photosphere (know) as the** chromosphere. The chromosphere (be) only a few thousand miles thick. It (be) located between the photosphere and the corona. **The corona, the outer atmosphere, (extend)** millions of miles into space.

PLANTS

All flowering plants **(compose)** of four organs - roots, stems, and flowers. The central part of plant (be) the stem. The roots **(attach) to the** bottom of **the** and usually (grow) underground. Some plants (have) one others (have) many small **leaves (connect) to the stem.** Some leaves (be) long others (be) fat and round. Some leaves (be) single, compound. **The f lower the** top of the stem. The **reproductive organs flower.** Most plants (hove) the and female organs in the flower. Some plants (have) male and female flowers.

(Adapted *from: Reading and Thinkng in English: Language in Use.* London: The British Council, 1981

Task 4 Variations

In the previous tasks, we looked at the two sentence patterns that are often used in making definitions. However, there are other ways of providing definitions as well. Given below are some words and expressions that are commonly used in definitions and explanations:

is / can be defined as by ... we mean refers to

Some examples of how these expressions can be used are provided below.

The term computer refers to the processor plus the internal memory chips.

A microchip can be defined as a tiny piece of silicon carrying an integrated circuit.

By peripherals we mean those devices attached to the computer.

Use the information in the table below to make as many definitions as you can using the words/expressions above. Note that not all of these words and expressions can always be used to define a term or concept. You can add additional information of your own to help explain the term more clearly. The first one is done for you.

Term	***Group***	***Characteristic***
carnivore	animal	eats other animals
prime number	number	only be divided by itself, by 1
alkali	chemical	dissolves in water, reacts with acid
element	substance	made of only one kind of atom.
calipers	instrument	measuring dimensions of small metal objects
proteins	food substance	need for growing, repairing damaged cells
melting point	temperature	a solid gets hot enough to turn to a liquid

Example:

By carnivorous we mean that the animal eats the meat of other animals. carnivores usually have strong jaws and teeth.

The term carnivore refers to an animal that eats other animals.

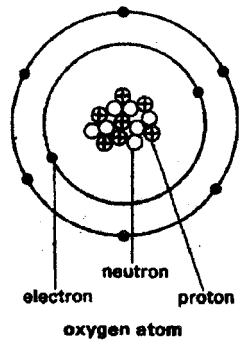
A carnivore can be defined as an animal that eats other animals.

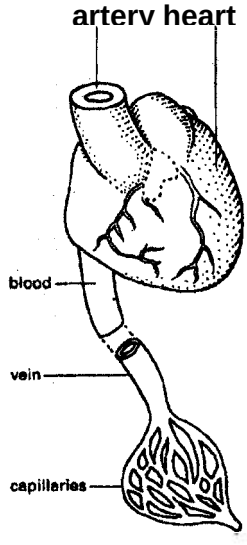
Task 5 ***Defining and Explaining***

Given below are short notes about ***The Atom*** and ***The Circulatory System.*** Use the notes and the diagram to provide a definition and explanation of these two concepts. You may make use of your own knowledge of these concepts.

THE ATOM

atom - smallest non-divisible part of element consist - nucleus and one or more electrons nucleus - centre of atom; consist - protons, neutrons electron move around central nucleus





THE CIRCULATORY SYSTEM

- heart, blood vessels, blood
- blood - thick red fluid, average human body - 6 pints of blood
- blood vessels - 3 types: arteries, veins, capillaries
- arteries - large tubes, carry blood all parts of body, arterial blood - bright red - oxygen
- capillaries - tiny vessels
- veins - narrow tubes; thin walls; inelastic
- heart - cone-shaped organ, located - centre of chest
- thick, muscular organ, four chambers.
- average heart - 13cm long, 9cm wide 6cm thick; weight - about 300g

Graphics from: 1981. *Reading and Thinking in English. Language in Use.* London: The British Council

Task 6 Defining

Work in groups of five.

List 5 maths and / or science terms or concepts that will need to be defined in a Form 1 class.

1.
2.
3.
4.
5

Exchange your list with another group. Now, try to define the terms / concepts in the list that you received from the other group.

Language Lab 2

GRAMMAR WORKS

INTRODUCTION

When giving explanations we often give a definition or make a general statement. The best way to clarify a point is to give an example. An example brings the general or abstract statement down to a specific or concrete image. Scientists use examples to explain or clarify a concept and to give evidence to support it. In this session we are going to look at ways of giving explanations in English.

Task 1 Exemplification

Read the text below and underline examples of chemical reactions

When do reactions occur?

Chemical reactions occur only under certain conditions. To start with, you have to have the right substances present. Cobalt chloride paper will not change colour from pink to blue unless water is present. Iron will not rust without air and water. This is why rusting does not occur on the moon - there is no air or water.

Secondly, you quite often need heat to cause a chemical reaction. To fry an egg you need to heat it in a pan. To get dough to rise you need to put it in a warm place.

Thirdly, you sometimes need electricity to cause a chemical reaction. This is what happens when you charge a car battery. The electricity produces changes in the chemicals inside the battery.

Reaction rate

Some reactions are slow, like rusting. Others occur quickly. Explosions are chemical reactions that occur very quickly and produce large amounts of heat, light and sound.

The speed of a reaction is called its reaction rate. A slow rate means the reaction takes a long time. A fast rate means it takes only a short time.

Wanted and unwanted reactions

All life depends on chemical reactions. Plants use the chemical reaction called photosynthesis to make food. Chemical reactions occur in your bodies to digest the food you eat. And further reactions are needed to produce energy for your body cells. Fuels such as coal and oil are also used to produce energy: for example, petrol is burnt in the engine of a car.

Most of the materials we use every day are made by chemical reactions. For example, synthetic rubber, plastics, detergents, fertilisers, paints and some medicines are made from chemicals found in oil. And the chemical reactions that occur in batteries allow us to produce electricity everywhere.

On the other hand, some reactions are unwanted. For example, house fires and bush fires are uncontrolled reactions that cause loss of life and property. Rusting and other forms of corrosion cause millions of dollars worth of damage. Tooth decay is caused by chemical reactions between your teeth and acids in food.

Reactions that occur in homes, in cars and in factories all create products that can harm our environment if not carefully controlled. Every year we learn more about the properties of the materials we use. For example, we now know that CFCs (chlorofluorocarbons), once used in aerosols and refrigerators, can destroy the ozone layer by reacting with it.

Source: Science World 7. Peter Stannard & Ken Williamson. Macmillan. 2000

You will have noticed that the text demonstrates how statements are accompanied by examples to illustrate the point.: Complete the grid below to show how English is used to exemplify concepts in the text. The first one is done for you.

Type of examples	Statement	Example
Examples make a point dear and at the same time, give evidence to support it.	*Chemical reactions occur* only under certain conditions	*Cobalt chloride* paper will not *change colour from pink to* blue unless water is present.
An example may comprise a few words, a sentence, a paragraph or more.		
Examples are not always marked with due words such as *for example, for instance,* and to illustrate, and often can only be identified by the context.		
Sometimes more than one example is used to explain the various aspects of a concept.		

Task 2 Present simple tense form

Explanations in Maths and Science are usually written in the present simple tense form. Sentences can contain either singular or plural subject forms. Appropriate verb forms are needed to make sentences that are grammatically correct. Subject-verb agreement means choosing the correct singular or plural verbs after the subject.

A prepositional phrase that comes between a subject and a verb does not affect the verb.

Points to note about number and agreement

Singular verb	Plural verb	Notes
A plant makes its food by photosynthesis. *The moon* travels round the earth.	*Plants* make their food by photosynthesis. *The planets* travelround the sun.	Singular subject (verb + **s** */es)* Plural subject (verb unchanged from root form)
	Orchids and roses grow well in the tropics.	Two (or more) subjects connected by **and** take a plural verb.
Every *bird and mammal* has a constant body temperature. Each animal *and plant* lives in a particular habitat.		***Every*** and ***each*** are always followed immediately by a singular noun. Even when there are two or more nouns connected by ***and***, the verb is singular.
The vampire bat living (in South America) sucks blood from living animals.	*Animals and* plants living (in a particular area) are part of the same ecosystem.	
Recycling helps to conserve the Earth's resources.		A gerund as the subject of a sentence takes a singular verb.
Physics is my favourite subject.		Nouns with a plural form takes a singular_ verb.

Source: Understanding and using *English.* Grammar. Betty Schrampfer Azar. Prentice-Hall 1989.

Read the following paragraph and fill in the correct form of the verb given in the box. The first one is done for you.

Affect Get Move Is Are Become Turn alter

Temperature ___ (1) matter in many ways. As a substance _____(2) hotter, its molecules_____faster and its properties_____(4) altered. The physical state of a substance_____(5) affected by its temperature. For example, at a temperature of 0^0 C water_____(6) a liquid; and at 100^0C it_____(7) to a gas (steam). Almost all other substances_____(8) similarly affected by temperature. Temperature_____ (9) the colour of matter. Iron for example, _____(10) red, then orange, and then white at increasingly high temperatures (You have seen the iron burner on a stove turn red).

GETTING IT RIGHT

TASK 3 Actions and their results

Sometimes examples of action and results are needed when giving explanations. Sentences have to be structured to show the cause effect patterns. The example below show the sentence pattern you can use for explaining the process of testing for carbon dioxide.

Example

The process of testing for carbon dioxide

The table below show how the sentence pattern can be constructed to explain how the process for a test for carbon dioxide is carried out

ACTION	And as a result With the result	Become/s (+adjective) Turn/s (+colour) Change/s into/be converted into (+noun)

Sentence 1

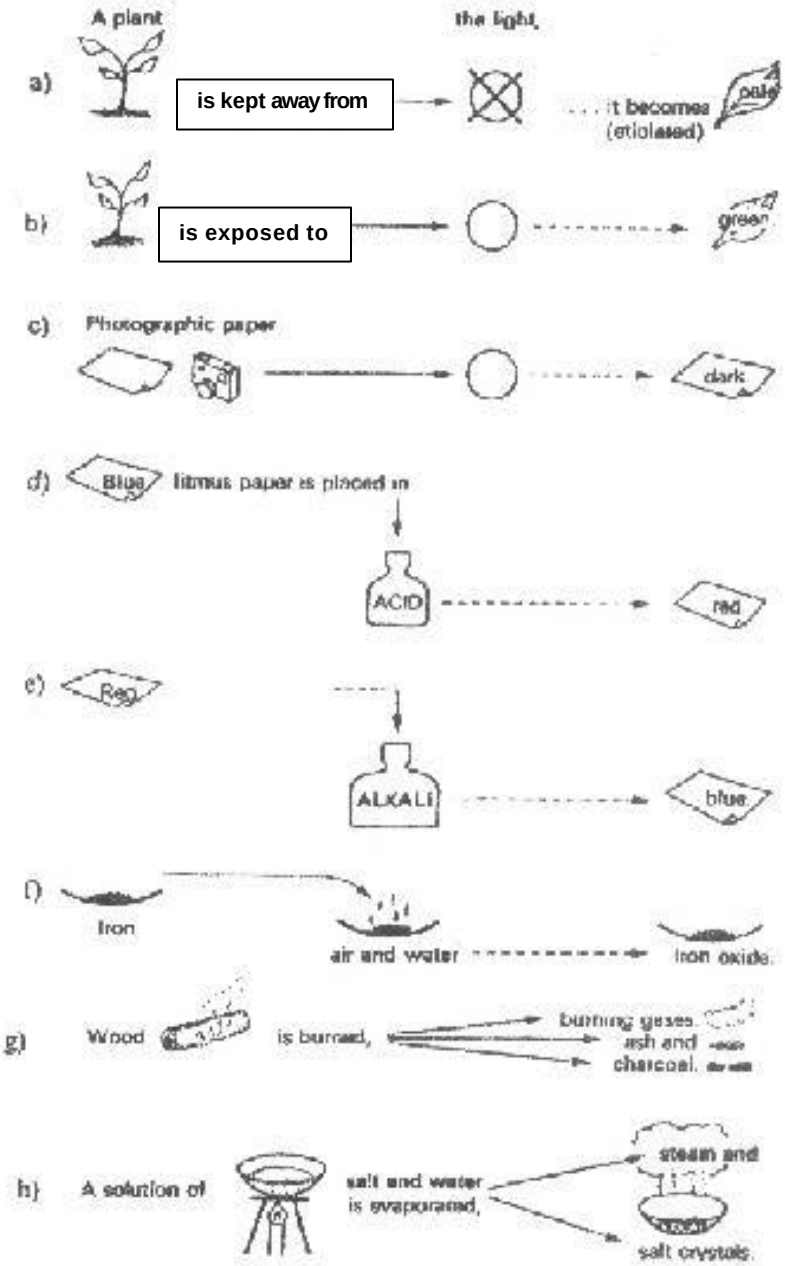
Carbon dioxide is passed through lime water and as a result the lime water turn chalky

Sentence 2

Carbon dioxide is passed thorough lime water with the result the lime water becomes chalky.

Make statements about the following actions and resulting changes

Example: *The plant is kept away from the light, and as a result it turns pale*



Source: *Nucleus General Science*. Martin Bates & Tom Dudley-Evans. Longman. 1976

TASK 4 If-conditionals

Exercise 1

The *if*-conditional is often used when we describe actions and their results in mathematics and science.
One of the patterns using the *if*-conditional is given below.

If a plant is kept away from the light,	It will turn pale.
If ice is heated to melting point,	It will melt.

The *if*-conditional is often used when we describe actions and their results in mathematics and science.

One of the patterns using the *if*-conditional is given below.

If a plant is kept away from the light,	It will turn pale.
If ice is heated to melting point	It will melt

Use the pattem above to form *sentences using the stimulus in Task 3.*

Exercise 2

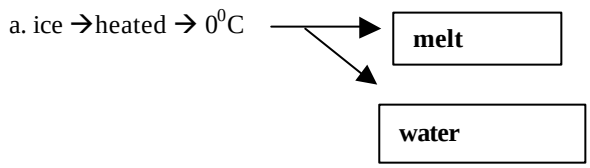
If there are two or more results of an action, you can use one of the patterns below.

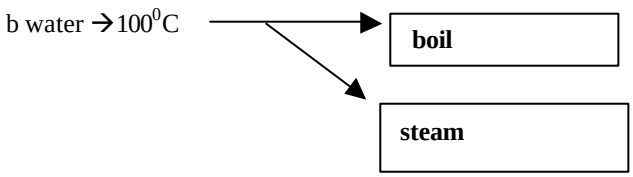
If a plant is kept away from the light,	it will turn pale	losing its ability to produce food. and lose its ability to produce food.
If ice is heated to melting point,	It will melt,	Changing into water. and change into water

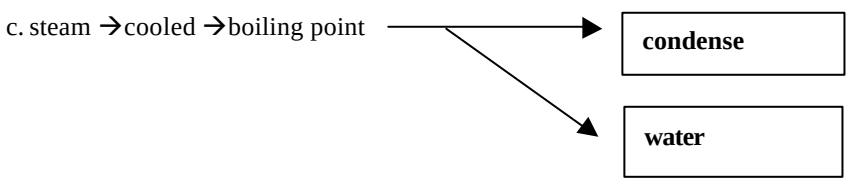
If there are two or more results of an action, you can use one of the patterns below.

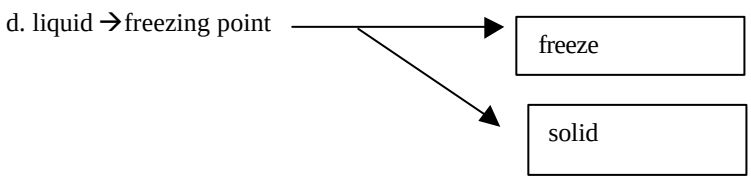
If a plant is kept away from the light,	it will turn pale,	losing its ability to produce food. and lose its ability to produce food.
If ice is heated to melting point,	It will melt,	changing into water. and change into water.

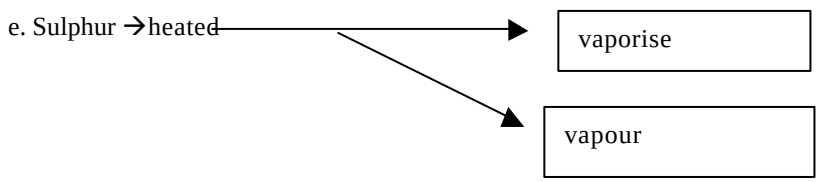
Use the pattern above to form sentences using the stimulus below.

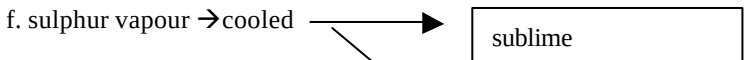




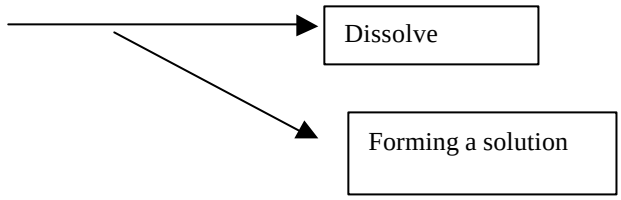




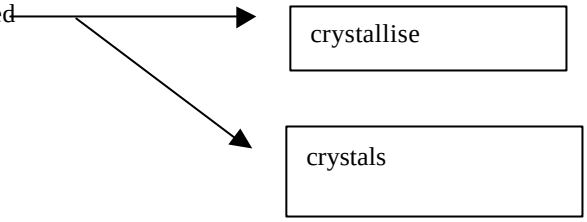




g. salt → pit in warm water



h. Salt in solution → evaporated



Source: Nucleus General Science. Martin bates & Tom Dudley-Evans. Longman. 1976

TASK 5 ***Cause - effect relationships***

Another way of writing sentences to show actions and results when giving explanations is by showing the cause - effect relationship using **because** of and **owing to** as shown in the sentence pattern given in the box below.

Example
Why do matches ignite when rubbed?

Sentence 1

Matches ignite when rubbed	***because of owing to***	Friction.
	because	friction generates heat.

Sentence 2

Why is looking directly at the sun harmful to the eye?

Looking directly at the sun is harmful to the eye because the sun's ray can burn the retina of your eye.

Below are a set of questions and *a set of explanations.*

- *Match the right reasons to the questions given.*
- Using the information write *answers to the questions just like the example given above.*

Explanations

Questions

1. Why do iron objects attract or repel?
2. Why do plants look green?
3. Why does wood float on water?
4. Why does water enter a pump?
5. Why does blood flow only one way in the heart?
6. Why do hydrogen balloons rise in air?
7. Why are some rocks used in making cements
8. Why do objects fall to the ground?
9. Why do metal objects sink in water?
10. Why do plants need CO_2 ?

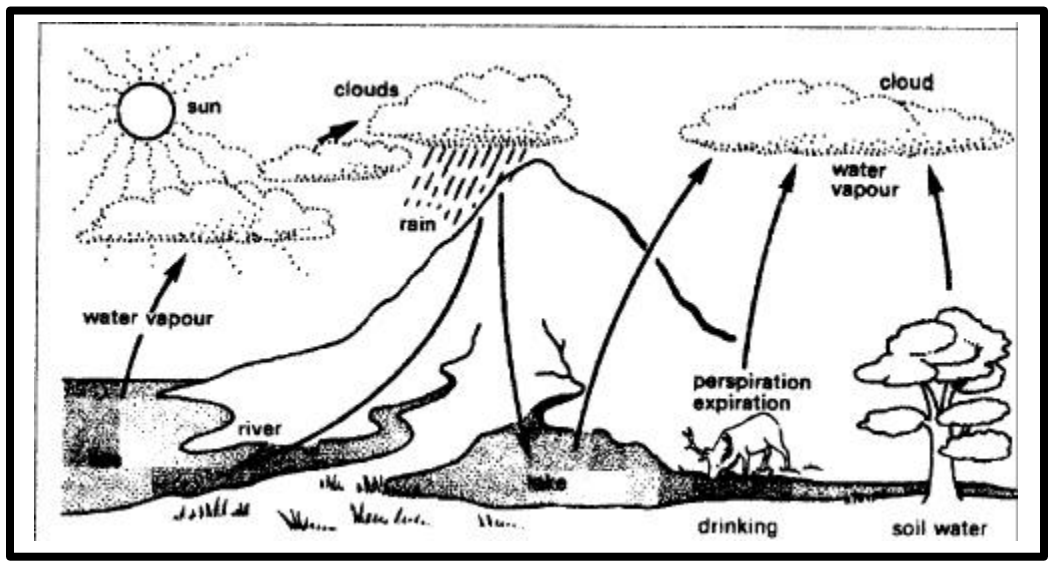
- Wood is less dense than water.
- Metal is denser than water.
- Plants contain chlorophyll.
- Plants use carbon dioxide and water to produce carbohydrates.
- Air is denser than hydrogen.
- A difference in air pressure
- valves
- magnetism
- gravity
- the calcium carbonate present in some rocks

TRYING IT OUT

TASK 6 Explaining cycles

Much of our weather is caused by water evaporating and condensing.

Explain the wader cycle in the diagram below.



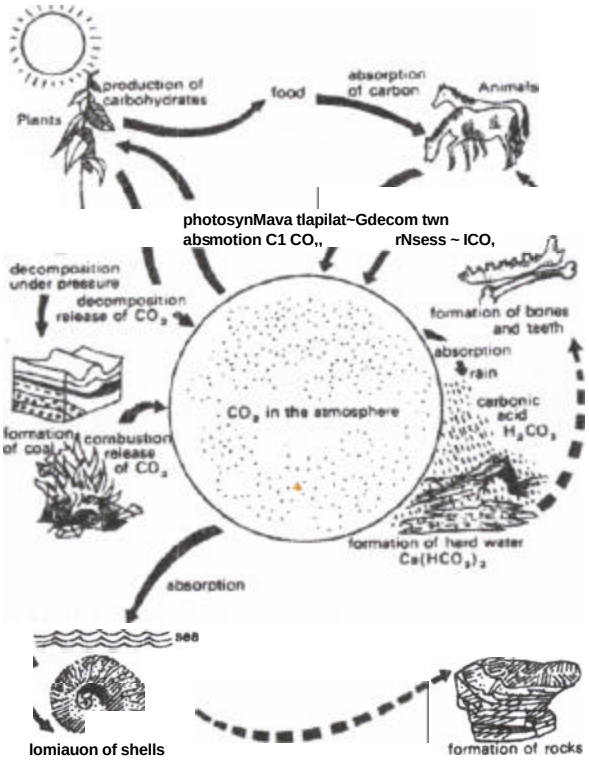
Source: Reading and Thinking in English: Concepts in Use. British Council. 1981

TASK 7 *Explanation*

Read the text below and study the accompanying diagram. Make sentences that are true to *explain actions and results represented in the information below.*

The carbon cycle

The life of plants and animals depends on chemical substances containing carbon atoms. Plants obtain carbon from the very small amounts of carbon dioxide in the atmosphere. This atmospheric CO, is continually absorbed and given off (releaseO in the 'carbon cycle'**.**



Source: Nucleus General Scefce. Martin Bates & Tom Dudley-Evens. Longman. 1976

After a volcano has erupted and the pressure has been released, the magma may harden to form a plug which blocks the vent. When this happens, the eruption stops, and we say the volcano is *dormant,* or sleeping. If it doesn't erupt again for a very long time we say it is *extinct,* or dead. On the other hand, if the pressure builds up, it may become active again.

When magma reaches the surface it is called lava. It is usually about 1000°C, and is red-hot. As it cools, it turns to solid rock. This may take weeks, or it may happen very quickly if the lava flows into water. Some volcanoes erupt quietly, with the lava spreading out to form a flat shield-shaped volcano. The volcanoes on the Hawaiian Islands are like this. Sometimes the lava is thin and runny. At other times it is thick and lumpy, like porridge, and hardly flows at all.

Volcanoes also produce gases, and some of these are poisonous. When lava contains a lot of gas it may froth violently. When this lava cools, the rock formed is full of holes where the gas bubbles used to be. *Pumice* rock is so full of holes, it floats on water. You often see it washed up on the beach.

Igneous rocks

Rocks which are formed from the molten rock of the mantle are called igneous rocks. The word igneous means 'from fire'. Examples of igneous rocks are *granite* and *basalt.*

Igneous rocks are made of crystals. These form from the substances in the magma, and have definite shapes and straight sharp edges-like sugar crystals. The crystals in granite are quite large, but the crystals in basalt are much smaller. You can usually infer how an igneous rock was formed from the size of its crystals.

Volcanic and plutonic rocks

There are two important groups of igneous rocks - volcanic and plutonic. Volcanic rocks are produced from rapidly cooling lava on or just below the surface of the Earth. The time taken for these rocks to solidify would be only days or perhaps months, depending on the thickness of the lava flow. Because the rock cools quickly it does not have time to form large crystals. Basalt is formed in this way.

If magma solidifies to form rocks well below the surface, the rocks are classified as plutonic after Pluto, the Greek god of the underworld. The crystals in a plutonic rock are large because they have had time to grow - as long as a million years. Granite is formed in this way.

As magma solidifies, some minerals become concentrated in certain places. For example the minerals may dissolve in hot water in the cooling rock. This hot water may then seep into the surrounding rocks, carrying the minerals with it. When the water escapes the minerals are left behind as crystals. These minerals may contain metal compounds called ores which can be nuned and the metals extracted.

Minerals and

All rocks are made of minerals. These are the building blocks of rocks. Some rocks contain only one mineral. For example, limestone contains only calcite. Most rocks, however, are a mixture of several different minerals. For example, granite is a mixture of three minerals - quartz, feldspar and mica.

Ore / mineral	Metal	Some uses
bauxite	aluminium	drink cans; aircraft parts
chalcopyrite (fool's gold)	copper	electrical wires; saucepans
Galena	lead	batteries; fishing sinkers
haematite	iron	steel girders

The table shows some common uses of ores; mined in Australia.

Under certain conditions, minerals occur as large crystals. These crystals have definite shapes which can be used to identify the minerals. For example, quartz always forms six-sided crystals which are often transparent. Some minerals can be cut and polished to form gemstones; for example, diamonds, rubies, sapphires and emeralds.

Source: *Science World 7.* Ken Williamson and P. Stannard. MacMillan.2000.

WORD EXPLORER

TASK 1 ***Technical terms***

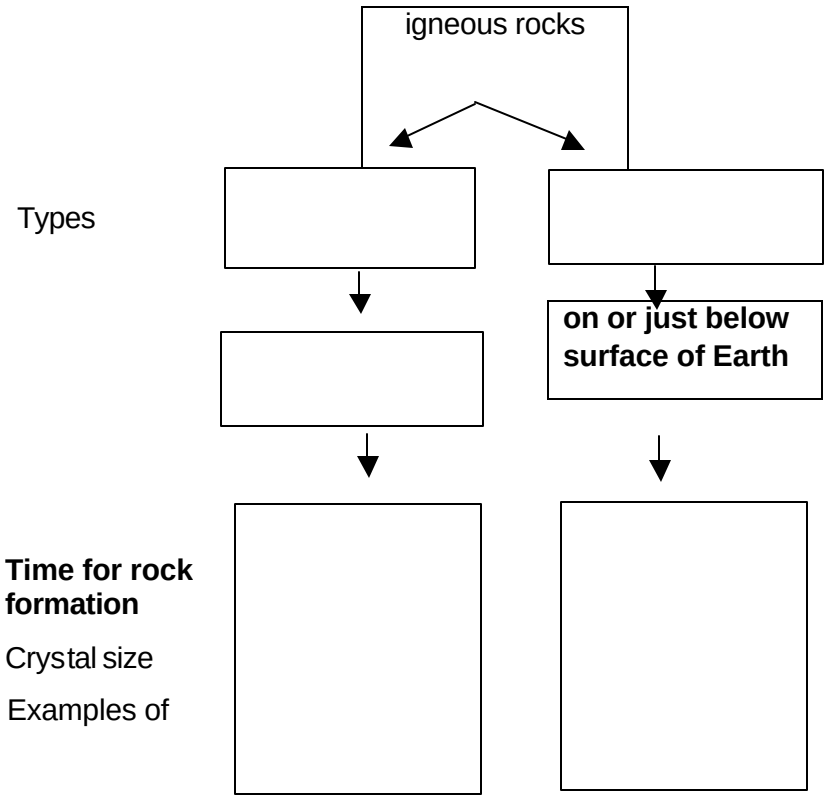
A list of Bahasa Melayu terms is given in the table below. Look for their English equivalents in the text.

Bahasa Melayu Terms	**English Equivalents**
1. letupan gunung berapi	
2. batu lebur	
3. batu ignius	
4. batu gunung berapi	
5. plutonik	
6. lava	
7. batuan	
8. memejal	
9. hablur	
10. basalt	
11. magma	
12. granit	
13. mineral	
14. lutsinar	
15. bijih	

CONNECTING WITH TEXT

TASK 2 ***Information transfer***

Use information from the text to complete the graphic organizer about *how igneous rocks are formed.*



TASK 3 ***Cause - effect relationships***

In the table below, the physical and chemical activities related to volcanoes are given in the column on the left, The results of these physical and chemical activities are indicated in the column on the right. Complete the table using information from the text:

Activity	**Result**
1. magma flows out through cracks in the ***Earth's crust***	formation of a volcano
2.	eruption of a volcano
3. frothy lava that is full of gas cools	
4.	formation of volcanic rock
5. rocks cool quickly forming small crystals	
6. magma solidifies to form rocks far below the surface	
7.	formation of granite

crack (noun)- a line on a surface where something is beginning to break apart

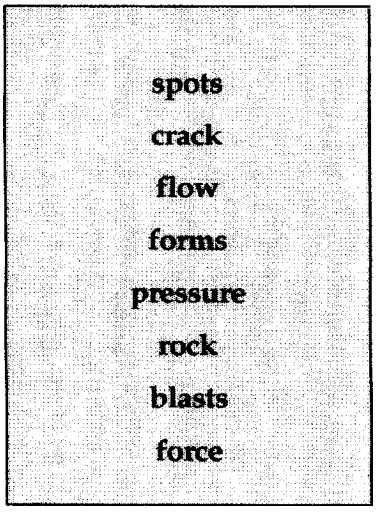
LANGUAGE IN ACTION

TASK 4 ***Nouns & verbs***

In English, many nouns are also used as verbs. Look at the dictionary definitions of the words below.

crack (verb - to damage something so that a line or long narrow hole appears on its surface, but it does not break into pieces

The following words are taken from the text. Can you say whether they are nouns or verbs? What helped you to decide?



Volcanoes

There are sometimes weak **spots** in the Earth's crust which may **crack** and allow the magma to **flow** to the surface. A volcano **forms** when this happens. The **pressure** inside the Earth pushes the magma upwards. Sometimes the molten **rock** oozes out steadily. At other times it **blasts** out with incredible **force**.

If a word has been used as a noun in the text, can you form a sentence to illustrate its use as a verb? For the verbs, form sentences to illustrate their use as nouns.

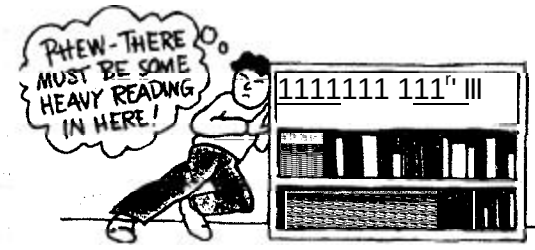
TASK 5 ***Using the articles***

Look at the text in the box below. Can you develop some rules to explain the use of the articles - **a, an** and **the** - as they are used in this text? When do we avoid the use of the article? Is there an instance of this in the text in the box?

[1] To understand this, think of what happens when you shake **a** can of soft drink. [2] Pressure builds up inside **the** can. 3 When you open it you release **the** pressure, causing **an** eruption.

Complete the text below *by filling in the blanks* with **a, an,** or ***the*** *where necessary.*

Friction is (1)_____example of (2)_____ contact force. It occurs whenever two surfaces in contact try to move past each other. Try rubbing your hands together quickly. Then try again with some soap and water on your hands. Your hands should move over each other more easily - (3)_____soap has reduced (4)_____ frictional force between them.

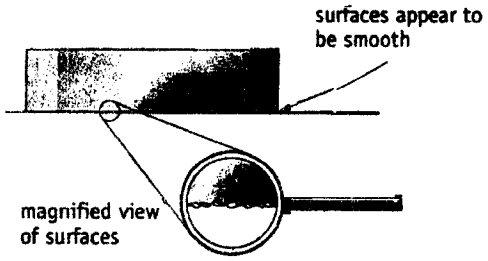


Friction always opposes motion. Suppose you try to push (5)_____ bookcase full of books, and it doesn't move. This is because of (6)_____ friction between (7)_____ bookcase and (8)_____ floor. This frictional force is just as large as your push but in (9)_____ opposite direction. If you get someone to help you, and your combined push is greater than (10)____maximum frictional force, then (11)_____bookcase will move.

Even when you do move (12)____object, (13)_____friction still opposes (14)_____motion. Stop pedalling your bike and (15) _____ frictional forces soon bring you to (16) _____ stop.

Friction occurs because objects are never completely smooth. (17)____ roughness of (18)_____ two surfaces means there are many points which catch and stick together (Fig 20).

Fig 20
Friction occurs because surfaces are never completely smooth.



Source: Science World 7. Ken Williamson and P. Stannard. MacMillan.2000.

SPRINGBOARD

Volcanoes are found in countries that lie within the earthquake belt. Among the South-east Asian countries, the Philippines and Indonesia lie in the earthquake belt. Volcanoes can cause a great deal of destruction.

in groups of three or four, discuss how our lifestyles would change if Malaysia were located in the earthquake belt Be prepared to present your views to the whole class.

STAND & DELIVER

REVIEW

Try to recall and list the language that you learnt in this module. Discuss with your partner how you could use this language for teaching mathematics / science.

SYLLABUS STUDY

Identify one syllabus item / curriculum specification that would require you to use these language forms when teaching in the classroom.

PLAN

Script the lesson phase as you would carry it out in the classroom. Include the actual) language that you would use in the classroom in your lesson notes.

DELIVER

Teach the lesson phase that you have prepared.

CHECKLIST FOR PEE FEEDBACK

Language Focus of Module:

Use this scale: 1 strongly agree 2 agree
3 disagree 4 strongly disagree

Item	

1.	The teacher's language is clear and easy to understand.	1 2 3 4
2.	The teacher links the different steps with appropriate language	1 2 3 4
3.	Teacher asks questions to elicit students' understanding.	1 2 3 4
4.	The language used is accurate.	1 2 3 4
5.	Correct technical terms are used.	1 2 3 4
6.	The teacher is fluent.	1 2 3 4
7.	The teacher hardly uses Bahasa Melayu	1 2 3 4
8.	Language used in the teaching aids is accurate.	1 2 3 4
9.	Teacher is able to use appropriate language to respond to students.	1 2 3 4

Interesting expressions used:

CHECKLIST FOR PEER FEEDBACK

Language Focus of Module:

Item	

Interesting expressions used:

Use this scale: 1 strongly agree 2 agree
3 disagree 4 strongly disagree

1.	The teacher's language is clear and easy to understand.	1 2 3 4
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5.	Correct technical terms are used.	1 2 3 4
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7.	The teacher hardly uses Bahasa Melayu	1 2 3 4
8.	Language used in the teaching aids is accurate.	1 2 3 4
9.	Teacher is able to use appropriate language to respond to students.	1 2 3 4

CHECKLIST FOR PEER FEEDBACK

Language Focus of Module:

Use this scale: 1 strongly agree 2 agree
3 disagree 4 strongly disagree

1.	The teacher's language is clear and easy to understand.	1	2	3	4
2.	The teacher links the different steps with appropriate language	1	2	3	4
3.	Teacher asks questions to elicit students' understanding.	1	2	3	4
4.	The language used is accurate.	1	2	3	4
5.	Correct technical terms are used.	1	2	3	4
6.	The teacher is fluent.	1	2	3	4
7.	The teacher hardly uses Bahasa Melayu	1	2	3	4
8.	Language used in the teaching aids is accurate.	1	2	3	4
9.	Teacher is able to use appropriate language to respond to students.	1	2	3	4

Interesting expressions used:

Item	

BACK TO THE FUTURE

LOOKING IN

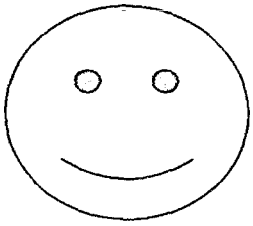
Progress Check- Where Am I?

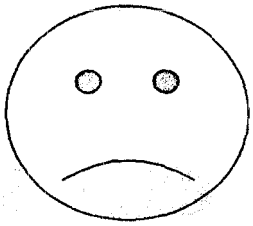
Based on the action plan you designed for yourself in the previous module, record the progress you have made in the grid below.

Are identified for attention	Action planned	Action taken	Achievement

How do you feel?

Please mark the spot between the two faces below to represent how you feel about the training programme you are here for.





At the end of each day, mark the spot between the two fares that represents your feelings about the sessions. Consider the speed of the process, the enjoyment:, satisfaction or other feelings you have with the programme.

Use different letters of the alphabets to indicate the spot for the different times as follows:

Z **at the end of day two.**

X for beginning of the module

Adapted from: *Using Evaluation in Training and Development. p 105.* Leslie Rae. Kogan Page. 1999

~~TEXT LAB~~					
Connecting with text					

STEPPING OUT

There are five language sessions in this module. Reflect on the tasks carried out **after each session**. How useful were they in preparing you to teach Mathematics and Science in English? Rate how useful the sessions have been on a scale between 1 and 5. If you do not find the task(s) useful please indicate the reasons in the comments column.

Scale: 1 not useful 2 partly useful 3 useful 4 very useful

World Explorer Task Areas	1	2	3	4	Comments
Task					

Language in Action					
Task					
Grammar Works					
Task					
Getting it right					
Task					
Trying it out					
Task					
LANGUAGE LAB 2					
Getting it right					
Task					
Trying it out					
Task					

LANGUAGE LAB 1					
Task					
Task					

STAND AND DELIVER					

HELPING MYSELF

Based on the module that you have just completed or your own language needs, identify an area that you feel requires attention to enable you to teach Mathematics and Science in English effectively.

Write out what you plan to do before the next session. Your action plan should contain

- **Time frame** (duration of your plan)
- **Things to work on (** your objectives)
- **Things to do** (activities I proposed to carry out to achieve my objectives)
- **Things I tried (** what I managed to do)

(Ö) Area/s that need attention	Action plan
Speaking ( )	Time frame
Reading ( )	
Vocabulary ( )	
Grammar ( )	Things to work on
	Things to do
	Things I tried

SAMPLE 1

HELPING MYSELF

Based on the module that you have just completed or your own language needs, identify an area that you feel requires attention to enable you to teach Mathematics and Science in English effectively.

Write out what you plan to do before the next sesslon, Your action plan should contain

- **Time frame** (duration of your plan)
- **Things to work on** (your objectives)
- **Things to do** (activities I proposed to carry out to achieve my objectives)
- **Things I tried (** what I managed to do)

(Ö) Area(s) that need attention	Action plan
Speaking ( ) Reading ( ) Vocabulary ( ) Grammar ( )	Time frame 10-15 September 2002 (5 days) Thing to work on To be able to use the auxiliaries – 'is', 'are', 'was', 'were' to construct 'Wh' questions accurately Things to do 1. Refer to one Grammar Reference book 2. Read up on rules to construct 'Wh' questions. 3. Complete practice exercise(s) given in the book. Things I tried 1. Read *Collins Cobuild Students Grammar*. Harper Collins 1991. 2. Practised Exercise B, p 59: Score: 67/100

S A M P L E 2

HELPING MYSELF

Based on the module that you have just completed or your own language needs, identify an area that you feel requires attention to enable you to teach Mathematics and Science in English effectively.

Write out what you plan to do before the next session. Your action plan should

- **Time frame** (duration of your plan)
- **Things to work on** (your objectives)
- **Things to do** (activities I proposed to carry out to achieve my objectives)
- **Things I tried** (what I managed to do)

Area(s) that need attention	Action plan
Speaking (√) Reading ( ) Vocabulary ( ) Grammar ( )	**Time frame** 10-15 September 2002 (5 days) **Thing to work on** To be able to talk in English for 10 minutes to the English teacher/a friend at least 3 time. **Things to do** 1. Identify someone who will collaborate with me. 2. Select a topic to talk about e.g. newspaper item **Things I tried**