ENGLISH FOR TEACHING
MATHEMATICS AND SCIENCE (ETeMS)

PHASE 1

MODULE 4
PRIMARY

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

ENGLISH FOR THE TEACHING OF MATHEMATICS AND SCIENCE (ETeMS)

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 EyeMS Programme

ETeMS invoves 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	

ENGLISH FOR TEACHING
MATHEMATICS AND SCIENCE (ETeMS)

PHASE 1

MODULE 4
PRIMARY

CONTENTS

TEXT LAB 1

INTERFACING WITH TEXT

Read the two short texts below. These texts describe some very basic mathematical concepts. Text A is entitled *What is an Angles?* and Text B has the heading*: Pythagoras' Rule.*

TEXT A

What is an angle?

AN ANGLE IA A WAY OF EXPRESSING the amount by which a line or other object turns. It can be formed by two straight lines meeting at a point, or in other ways, such as by a vehicle traveling around a corner. Angles are usually expressed in degrees using the symbol ^{0}, and are classified according to their size. A full turn – when an object rotates about one end point and returns to its original position – is 360^0. A right angle is 90^0; an angle less than 90^0 is an acute angle; one between 90^0 and 180^0 is obtuse; and one that is more than 180^0 is a reflex angle. In advanced mathematics, such as calculus (p. 71), angles are measured in radians, written with the abbreviation "rad". The Greek astronomer Hipparchus (p. 126) is credited with dividing a circle into 360^0. He inherited the idea from early astronomers, who believed that the Earth was stationary and the stars revolved around it on a circular band of 12 parts, each comprising 30 days, roughly equal to one cycle of the Moon.

Navigating in the ice

Navigators take bearings in degrees measured clockwise from magnetic or true north. This picture shows a path being cut through ice for ships on a 19th century Arctic expedition. Compass readings would have been vital in planning the ships' course.

Source: *How Maths Works*, Carol Vorderman, Dorling Kindersley, 1998.

TEXT B

PYTHAGORAS' RULE

CHAPTER STORY: THE 3-4-5 TRIANGLE

A triangle with sides of 3, 4 and 5 units has been used since ancient times to form a right angle. Archaeologists have found it used on clay tablets made by the ancient Babylonians, made around 1500 BC. It was also used by the ancient Egyptians.

Each year after the Nile River had flooded, Egyptian farmers found that the boundary markings of their farms had been washed away. To avoid arguments, surveyors called rope stretchers were called in to mark out the land into rectangular plots of the original size. The surveyors used a rope with knots marking twelve segments of the same length. With the ends of the rope joined and the sides pulled straight, they marked out a triangle. When they pegged the rope out to form a triangle with sides 3 units e units and 5 units, they were able to mark out a right angle.

Practically every ancient writing on mathematics or astronomy mentions the special relationship between the sides of a right-angled triangle. This result was known by the ancient Greeks. The mathematician Pythagoras (580-501 BC) is given credit for developing the first proof of the general result that now bears his name.

The story of the life of Pythagoras is mixed with legend. He was born on the island of Samos in the Aegean Sea and probably studied in Egypt and Phoenicia, before he settled in the Greek community at Croton in southern Italy. Many people came to learn from him and he gathered a group around him, which became a secret society. The members of the Pythagorean society wore distinctive clothes and were taught that numbers had magical properties.

Over the years many famous people have written their own proofs for the Theorem of Pythagoras. These include the Italian artist and scientist Leonardo Da Vinci, the twelfth-century Indian mathematician Bhaskara, and even the former President of the United States of America, James A. Grafield.

Source: *New Course Mathematics Year 8,* Bigelow, Stone & Steenson, Macmillan, 1999.

WORD EXPLORER

TASK 1 *Vocabulary building*

(a) Skim through both texts and list those words and phrases that you find difficult in the firs column below.

(b) Check your list with that of your partner. If a word appears on your partner's list but not in yours, explain the meaning of that word to your partner. Get your partner to do the same. Eliminate the words or phrases whose meanings you now know.

NO.	UNFAMILIAR WORD	MEANING	BAHASA MELAYU EQUIVALENT	TECHNICAL VOCABULARY? (PLEASE TICK [√])	NON-TECHNICAL WORD? (PLEASE TICK [√])
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

CONNECTING WITH TEXT

TASK 2 *Comprehension of Text*

Read Text B Pythagoras' Rule once again and then, answer the following questions.

1. What evidence is there to show the 3-4-5 Triangle has been in use for a very long time?
2. For what practical application was this rule used in ancient Egypt?
3. What do you think of the name "rope stretchers" for surveyors?
4. Explain the special relationship between the sides of a right-angled triangle.
5. What is Pythagoras credited with?
6. How did members of the Pythagorean society identify themselves?
7. What does "it" in line 3 refer to?
8. "they" in line 10 refer to….
9. In line i5, "his" refer to….
10. Who does "their" in line 22 refer to?
11. "these" in line 23 refers to….

LANGUAGE IN ACTION

TASK 3 *Language Awareness*

Given below are short extracts from Text A and Text B. Note the tense forms of the verbs highlighted. Clearly some forms are more common in one text than in the other.

TEXT A	TEXT B
Angles **are** usually **expressed** in degrees using the symbol ^{0}, and **are classified** according to their size. A right angle **is** 90^0; an angle less than 90^0 **is** an acute angle…	Each year after the Nile River **had flooded,** Egyptian farmers **found** the boundary markings of their farms **had been washed away.** To avoid arguments, surveyors, **called** rope stretchers **were called** in to mark out the land…

Get into groups of 4 or 5 and compare Text A and Text B. Examine each text in terms of

- The most common tense form used.
- The voice (active or passive)
- The sentence structure (Is there a definite pattern?)
- The purpose of each text

Discuss and, if you can, draw some general conclusions about text type and the use of the tense form in each of the two texts.

Appoint a member to represent the group and share your views with other teacher on this course.

SPRINGBOARD

TASK 4 *Applying Knowledge of Discourse Structure*

Study Text A What is an Angle? Again. Examine how the topic is presented and explained. Then:

(a) arrange the sentences below in a logical order and rewrite them in a paragraph. Your paragraph should have the heading: INTRODUCING THE CIRCLE.

(b) draw a circle and the parts mentioned in this description. Label the parts.

- When we see a rainbow from the ground we only see the arc of each circle but, viewed from the air, the whole circle can be seen
- This distance is called the radius (r) or the circle.
- Any straight line across the circle that does not pass through the center is a chord, and any part lying between two points on the circumference is called an arc.
- Circles occur everywhere in nature: in the shape of the human eye, patterns on a butterfly's wing, and cross-sections of trees.
- A circle is a shape in which every point on its circumference is the same distance from the center.
- In mathematics, the circle is one of a group of curves that are known as conic sections.
- The line running through the center from circumference to circumference is called the diameter
- A rainbow is a collection of circles, one for each colour.
- The diameter is twice the radius.

POST-TASK ACTIVITY

What difficulty if any did you experience in attempting Task 4? What was / were the causes of this difficulty?

LANGUAGE LAB 1

GRAMMAR WORKS

TASK 1 *Forms and Functions of Imperatives*

To give instructions on how to do something you can give them as a list of steps. The steps below show how iron is extracted.

Text A

EXTRACTION OF IRON

1. Mix the iron ore with coke and limestone.
2. Put the above mixture in a blast furnace,
3. Heat the furnace to a high temperature (1,800^0 C) i.e. until the iron melts and flows to the bottom.
4. Channel the molten iron into molds.
5. Remove the molds for further processing into steel or wrought iron.

Study the instructions on the extraction of iron above and answer the questions below.

1. What are the verbs found at the beginning of their instructions?
2. What is the function of the verbs at the beginning of each instruction?
3. What are the verbs called?
4. What is the tense of the verb used?
5. What is the subject? Is the subject stated?

Below are some notes about the Imperative to help you understand its forms and functions

The Imperative Form

The imperative form is the same as the bare infinitive as in the following examples

- **Affirmative form** (base form of the verb) ***Sit!***
- **Negative short form** (Don't + base form) **Don't *sit!***
- **Emphatic form** (Do + base form) **Do *sit.***
- **Addressing someone** (e.g. pronoun + base form) **You *sit here!***
- **Imperative + Question Tag** ***Sit here,* will you?**
- **Imperative joined by and** ***Sit* and *keep* quiet**!

Some common uses of the Imperative.

We use the imperative for direct orders and suggestions and also for a variety of other purposes. Stress and intonation, gesture, facial expression, and above all, situation and context indicate whether the use of this form is friendly, abrupt, angry, impatient, persuasive, etc. The negative form is usually expressed by ***Don't***. The full form ***(Do not)*** is used mainly in public notices.

Some common uses of the imperative form:

1 **Direct commands, requests, suggestions:**
Follow me. Shut the door (please). Don't worry!

2. **Warnings:**
Look out! There's a bus. *Don't panic.*

3. **Directions:**
Take the 2nd turning on the left and then *turn* right.

4. **Instructions:**
Use a moderate oven and bake for 20 minutes.

5. **Prohibitions** (in e.g. public notices) :
Keep off the grass*! Do not feed* the animals!

6 **Advice** (especially after *always* and *never*):
Always answer when you're spoken to! *Never speak* to strangers!

7. **Invitations:**
Come and have dinner with us soon.

8. **Offers:**
Help yourself. Have a biscuit.

9. **Expressing rudeness:**
Shut up! Push off!

TASK 2 *Sequence Connectors*

The written instructions on the extraction of iron in Task 1 can be rewritten as below.

Text B

First mix the iron ore with coke and limestone. Then put the mixture in a furnace. After that heat the furnace to a high temperature (1,800 ^{0}C) i.e. until the iron melts and flows to the bottom. Next, channel the molten iron into the large molds. Finally remove the molten iron for further processing into steel or wrought iron.

Study the instructions above and answer the questions below.

1. What are the words added in this text as compared to the instructions in Task 1?
2. Where are these words used?
3. What do you call these words?
4. What are the functions of these words?
5. Can you give other examples of similar words and their functions?

GETTING IT RIGHT

TASK 3 *Imperatives*

You would like to demonstrate a science trick to your students. Below are the instructions and pictures on How to Balance Anything. Fill in the blanks with the appropriate imperatives to complete the instructions. The first one has been done for you.

balance, twist, tape, support, move, slide, locate, roll up, tie up, fix, glide,

How to Balance Anything

1 Locate the center of gravity of an irregularity shaped object and 2 it in three seconds!

3 newspaper or construction paper to make several narrow cone. 4 them together to form one long cone. The longer the cone, the more impressive the trick.

5 the cone on your index fingers placed under each end of the cone. Gradually 6 your fingers toward the center of the tube.

____7__ your finger under the cone bit by bit until they meet exactly at the cone's center of gravity. The cone will stay balanced at the pint.

How Does It Work?

The center of gravity is near the thick end of the cone, so the finger holding up the narrow end is subjected to less friction from the paper. As you slowly move both fingers toward the center, the finger on the low-friction end will move first. As it moves, though, the weight on it increases until it stops moving, so the other finger, which now is under less pressure from the paper, starts to move. This alternation between the two fingers continues until they meet at the center of gravity.

What Else can You do?

ou use your arms instead of our fingers, you n balance just about any long object. If you're really strong, you can even find the center of gravity of a child lying straight across your extended arms.

Source: Amazing Science Tricks, Michio Goto, 1999 Kodansha International Ltd

TASK 4 *Imperatives*

Given below are a set of instructions on how to make a spirit level. Complete the text using the appropriate imperatives given below. You may use the imperatives more than once.

wrap, attach, stick, put, wait, seal up, seal, pour, fill, seal in, cut, slice, make sure, mark,

How to make a spirit level

Introduction

A spirit level is an indispensable tool for carpenters and builders. It is laid on a horizontal surface and the position of the bubble inside will indicate whether or not the surface is level. If it is, the bubble will be exactly in the center. This spirit level measures only very small angles in relation to horizontal surfaces.

Materials

a strip of wood, a pair of scissor, a pen, modeling clay, adhesive tape, food colouring, parcel tape, clear plastic tubing, a funnel, a jug of water

Method

1. _____ a 30 cm. (12 inch) length of transparent tubing. _____ _____ that the inside and outside are clean, then _____one end with modeling clay.
2. _____ coloured water into the tube so that it is almost full. _____ _____ that you leave a little space at the end so that an air bubble can form.
3. _____ _____ the water with another small piece of modeling clay, leaving a gap for the air bubble. _____ plenty of parcel tape neatly around both end of the tube. This prevents the water from leaking out and limits the loss of water through evaporation.
4. _____ the water-filled tube securely to the strip of wood with adhesive tape. If you first position a piece of modeling clay under the center of the tube so that the tube bend upwards slightly, the spirit level will give more accurate readings.
5. _____ the spirit level on a flat surface such as a table or a shelf. _____ until the air bubble comes to rest roughly in the middle of the tune and _____ the ends and the center of the bubble with an ink pen. This will be your reference for a totally horizontal, flat surface.

Source: How Maths Works, Carol Vorderman. Dorling Kindersley, 1996

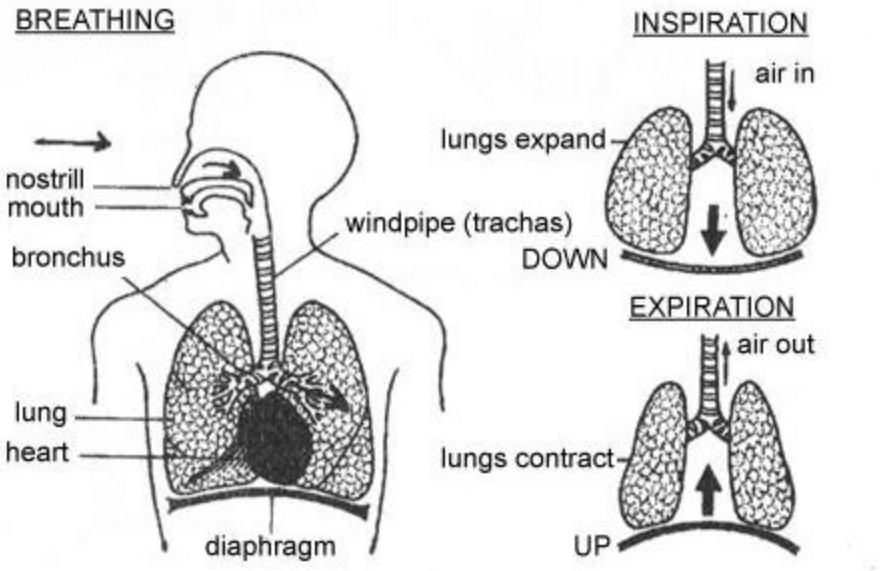
TRYING IT OUT

TASK 5 *Respiration*

Study the diagram below and answer the questions that follow.

1. Rearrange the sentences in the correct order as indicated by the diagram.
2. Write a paragraph on inspiration using appropriate sequence connectors and other suitable words.

The air passes through the bronchi.
The nose filters dust from the air.
The air passes down the trachea.
The air enters the lungs.
Air enters the nose.
Air is forced in.
Air is forced out.
The lungs are compressed
The lungs expand.
The diaphragm rises.
The diaphragm falls.



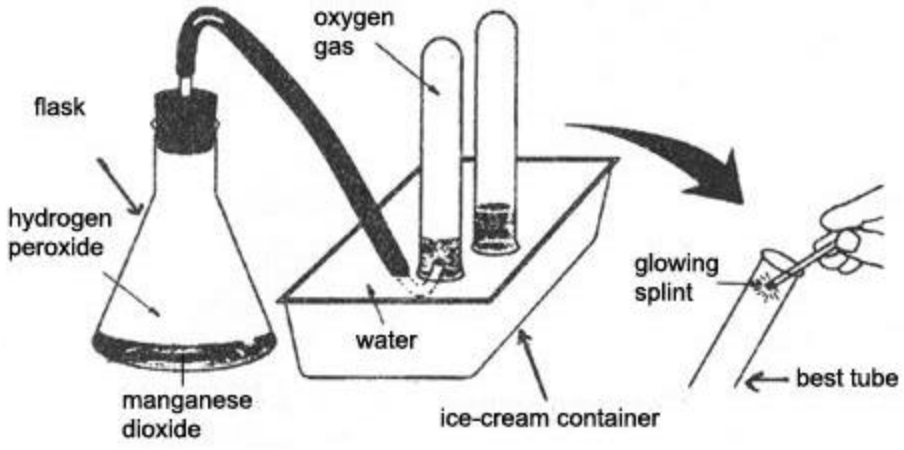
Source: Reading and Thinking in English, British Council, Oxford University Press 1980

TASK 6 *Making Oxygen*

You want your students to carry out an experiment to make oxygen based on the pictures and notes below.

- Use the words given to write down the instructions
- Using the instructions you have written, practise giving oral instructions to our peer.

1. ice-cream container/water/half fill/ two test tubes upside down/ water
2. pea-sized manganese dioxide powder/flask/put
3. milliliters hydrogen peroxide/flask/pour/stopper and tubing
4. tubing under test tube/place/collect oxygen
5. test tube full/light wooden splint/blow
   test tube out of water/take/put glowing splint/glow brightly
6. test second tube same way/collect second tube of oxygen



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

LANGUAGE LAB 2

GRAMMAR WORKS

Read the following extract.

BIG STRIPPERS

Strip mining is a form of open-cast mining in which the rock **is drilled and blasted** to loosen the material. It **is** then **stripped or scraped** out by giant drag line, shovels or excavators.

Open cast mining is very destructive of the environment. Sometimes, when the mine is worked out, the waste rock and soil are replaced and the area is landscaped, but the disruption to plant and animal life taken many years to put right.

However, open cast mining is cheaper than underground mining because much larger equipment can be used. So it used wherever there are valuable minerals. About 70 per cent of all ores come from surface mining where equipment can dig down to 500 metres.

To make deep mining worthwhile, the yield must be high or the product rare and expensive, like diamonds. Shafts, tunnels, lighting, ventilation and water pumps are all expensive requirements for deep mining. Deep mines are usually excavated to a depth of about 1,830 metres, although some diamond mines may be as deep as 3,000 metres. Once the shaft has been dug, timber, steel and concrete pillars are used to support the rock and protect the workers. The ore or rock must be drilled or blasted to produce manageable-sized rock, which is carried to the surface by hoists on the main shaft. The drilling is usually done by pneumatic hammers.

Blasting is sometimes used to free ore from underground mines. Holes drilled into the rock are filled with small explosive charges, which are set off to break up the rock. The location and angle of drill holes is determined by the type of rock, the number of rock faces exposed, and the lines of weakness in the rock.

In large mines, electrical and battery-operated rail systems haul hundreds of tons of coal or ore into the main shaft. Conveyor-belt systems are also common in coal mines. For continuous mining, some mines employ a track-mounted unit with teeth or rotating chains as the cutting head.

Extract from: Energy and Resources QUEST - adventures in the world of science No. 83
Marshall Cavendish Discovery Collection, 1994

TASK 1 *Awareness Raising*

The passive forms are used extensively in the above extract. Do you know what they are? Read the following notes on the Passive and do the task at the end of the **NOTES.**

NOTES

The Passive is commonly used when reporting – orally or in writing – any description of a process or procedure. Often the report will reflect very closely, the instruction received or given in order to carry out the processor procedure for the sake of fidelity and precision.

Example:

INSTRUCTION (using the Imperative)	REPORT (using the Past Tense Passive)
1. **Place** the mixture in a crucible. 2. **Heat** it to a temperature of 300^0 C. 3. **Allow** it to cool. 4. **Analyse** it.	1. The mixture **was placed** in a crucible. 2. It **was heated** to a temperature of 300^0 C. 3. It **was allowed** to cool. 4. **It was analysed.**
Often number (as indicated above) are used to show the sequence in which a process or procedure is to be carried out. When reporting, however, sequence markers (and logical connectors) are used e.g. First, then, meanwhile, subsequently, at this stage, next, afterwards, later, eventually, finally. See ⟶	**First,** the mixture was placed in crucible. It was **then** heated to a temperature of 300^0 C. **After that** it was allowed to cool and **finally** the mixture was analysed.

The table below gives some of the passive forms:

TENSE OR VERB FORM	IMPERATIVE	ACTIVE VOICE	PASSIVE VOICE
Simple Present	keep	keeps	is kept
Present Continuous		is keeping	is being kept
Simple Past		kept	was kept
Past Continuous		was keeping	was being kept
Present Perfect		has kept	has been kept
Past Perfect		had kept	had been kept
Future		will keep	will be kept
Conditional		would keep	would be kept
Perfect Conditional		would have kept	would have been kept
Present Infinitive		to keep	to be kept
Perfect Infinitive		to have kept	to have been kept
Present participle / Gerund		keeping	being kept
Perfect Participle		having kept	having been kept

For you to think about

1. What do you notice about the form of the passive?
It is made up of two elements e.g. **was placed**

2. What can you say about the firs element of the passive?
It is a form of the verb to be [**was**]

3. What do you notice about the second element?
This is a Past Participle [**placed**]

Task

Underline all the Passive forms in the extract above. The first two have been done for you.

Is drilled and blasted

Is then **stripped or scraped**

GETTING IT RIGHT

TASK 2 *Making Imperative, Passive*

As mentioned earlier, the passive form is often used for reporting a "process". One reason for this is to shift the focus from the person who is carrying out the process to the process itself. It helps to give prominence to what is done rather then put the "doer" in the spotlight. It also conveys a sense of detachment on the part of the writer and suggests objectivity and neutrality.

The next task will give you practice in changing the Passive to the Imperative

A . Identify and write down the passive structure for the text on 'BIG STRIPPERS' that matches the Imperative form given in the first column in the table below. Note that this need not always be a complete sentence; it could be sentence fragments (part of a sentence) too.

The first one is done for you.

THE IMPERATIVE FORM	THE PASSIVE FORM (as in the text)
Drill and blast the rock to loosen the material	The rock **is drilled and blasted** to loosen the material
Giant drag lines… **strip or scrape** the rock/ ore.	
Replace the waste rock and soil and **landscape** the area	
Use timber, steel and concrete pillars to support the rock and protect the worker	
Carry the manageable sized rock to the surface by hoist on the main shaft	
Pneumatic hammers **do** the drilling..	
(Sometimes) **use** blasting to free ore from underground mines	
Fill the holes drilled into the rock with small explosive charges	

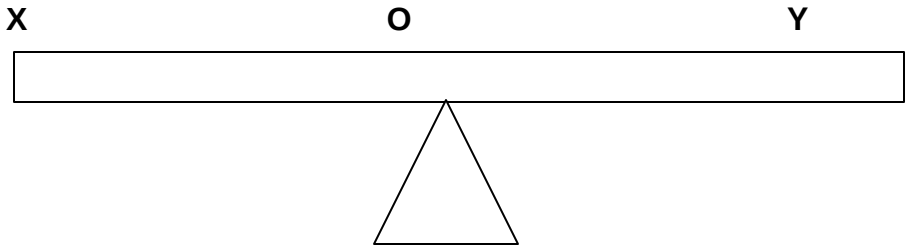
B. *What happens to the verb forms in the process of transformation from imperative to Passive?*

GETTING IT RIGHT

TASK 3 *From Instruction to Report*

The following is a set of instructions for an experiment on balance.

Transform the Imperative structures into statements in the passive to produce a report. The first instruction has been changed into a passive statement for you. Do the same for the rest.



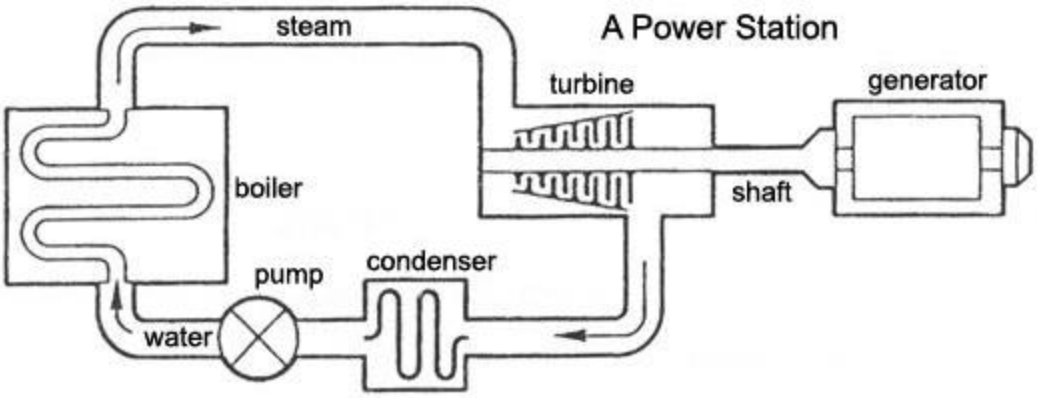
THE INSTRUCTION	THE REPORT
Pivot a metre stick at its central point O so that it balances.	A metre stick **was pivoted** at its central point O so that it was balanced
Attach a cord to a 1 kg mass and **suspend** it from a point P on the side OX, 200 mm form the center point.	
Note what happens. (The metre stock turns in an anti-clockwise direction	
Suspend a second mass of 1 kg from a point on the side OY.	
Adjust the distance between O and the mass until the stick remains in a horizontal position.	
Measure the distance between O and the second mass.	
Replace the second 1 kg mass with a 0.5 kg mass.	
Note what happens. (The metre stick turns anti-clockwise)	
Move the 05 kg mass along OY until the stick again balances.	
Measure the distance between O and the point S where the 0.5 kg mass is suspended.	

TRYING IT OUT

TASK 4 *Describing how it works*

Below is a description on how a power station works. Complete the description using the **present passive form** of the verbs given. The first one is done for you.

return, use, send, turn, draw, power, pump, convert, drive, burn, take, produce



Water (1) **is pumped** at high pressure along the boiler pipes. Coal or oil (2) _____ in the boiler and the water (3) _____into high-pressure steam. The steam (4) _____by pipes to the turbine when it (5) _____ to drive the shaft at high speed. In this way, the generator (6)_____, and electricity (7) _____. From the turbine the steam (8) _____ over pipes of cooling water in the condenser, and (9)_____into steam again. Then the water (10) _____ to the boiler by the pump.

Source: Source: *English for Technical Communication*. Tom Hutchison and Alan Waters. P35. Longman 1984

TASK 5 *Describing how it works*

Complete this description of how a gas turbine works by filling in each blank with an appropriate word from the list below but in its **passive form.** The diagrams on the following page should help you understand the description better.

drive, force, burn, form, draw, deflect, admit, need, destroy, shown, preheat, mount, produce, use, start, heat.

HOW A POWER STATION WORKS

Gas turbines _____(1)_____ by the combustion gases from liquid fuels. In construction and operation they resemble steam turbines in that a flowing medium with a high energy content – i.e. combustion gases – produce a rotary motion as a result of _____(2)_____by rings of blading mounted on a rotor. The operation of a gas turbine _____(3)_____ schematically in Fig. 1: the compressor draws in fresh air and compresses it to pressure of 50 – 70 lb/in^2 ; the air _____(4) _____by a compressor through a heat exchanger (the regenerator) where it _____(5)_____ by the heat that is still present in the exhaust combustion gases emerging from the turbine; and finally the preheated air _____(6)_____into the combustion chamber. In this chamber, liquid fuel _____(7)_____, thereby producing gases with a temperature of about 650 ^{0}C. These combustion gases flow at a high velocity into the turbine and drive it.

The turbine itself, the compressor, and the electric generator _____ all _____(8) _____ on a shaft. The turbine cannot transmit its entire power output to the generator, for a substantial proportion _____(9)_____for driving the compressor. The turbine _____(10)_____ with the aid of an electric motor which first has to set the compressor in motion, in order to produce compressed air and supply it to the combustion chamber so as to enable the combustion gases to _____(11) _____. Only then can the turbine start running. Fig. 2 shows the main features of a gas turbine. The most familiar form of gas turbine is the jet propulsion engine for aircraft. This is a particular, specialised form of turbine, however. Ordinary gas turbines _____(12_____ only in cases where the liquid fuels they use are cheaper than coal.

Another type of gas turbine is the hot-air turbine (Fig. 3). Here the rotary _____(13)_____ not by combustion gases, but by air which _____(14)_____ in a heat exchanger by the hot combustion gases. This hot air re-circulates continuously, i.e., it _____(15)_____into the compressor again after leaving the turbine. However, the air must be cooler before entering the compressor, otherwise the blading of the latter would soon _____(16)_____as a result of operating art excessively high temperatures.

Source: *How Thing Work: The Universal Encyclopedia of Machines, Volume!, Paladin 1972*

TYPES OF TURBINE

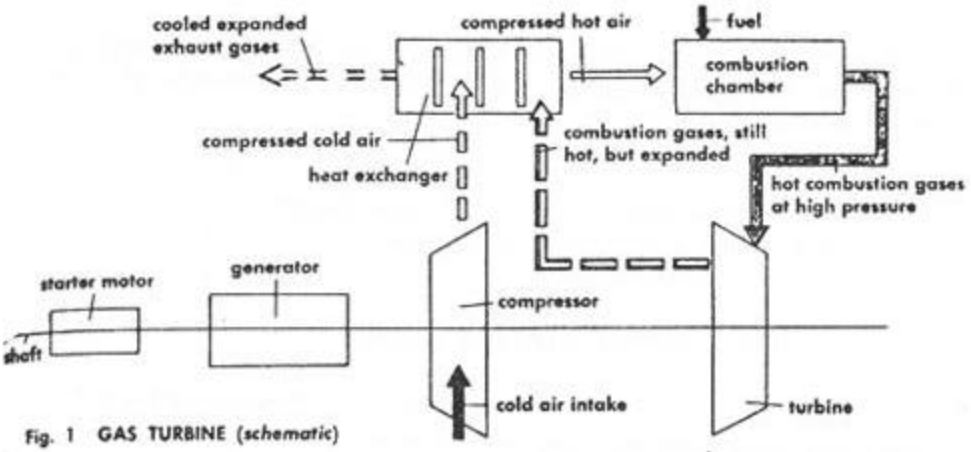


Fig. 1 GAS TURBINE (*schematic*)

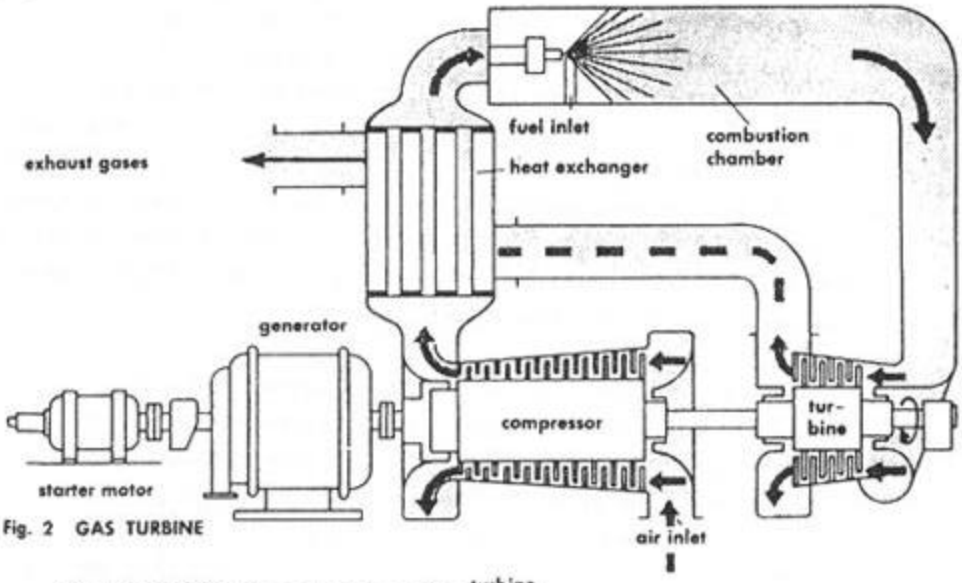


Fig. 2 GAS TURBINE

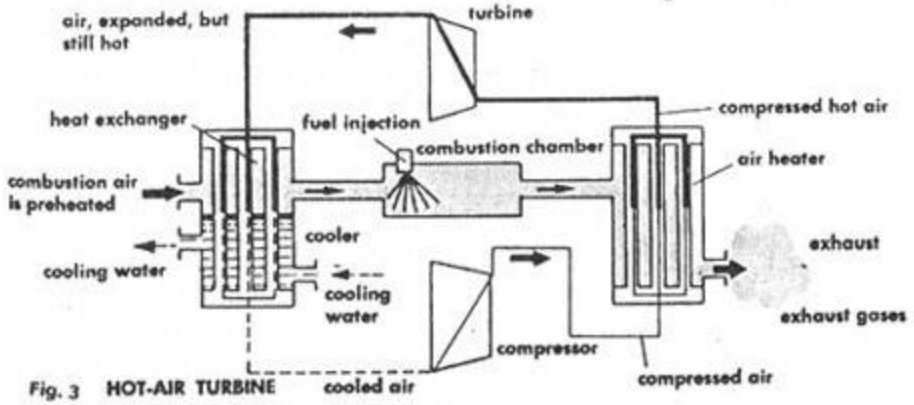


Fig. 3 HOT-AIR TURBINE

TEXT LAB 2

INTERFACING WITH TEXT

*The text you are about to read is entitled **"Using Statistics"** and it is about the use and abuse of statistics and makes interesting reading. Enjoy it!*

TEXT

Using statistics

Collecting and analyzing statistical data are important in many areas. Some examples are:

- A marketing company may want to find the level of community awareness about a new product.
- In business, sales statistics may be analysed to see how well the business is going.
- State governments need to know statistics on population growth and movement to make decisions about the locations of schools and hospitals.
- In medical science, the results of tests on medicinal drugs are analysed to assess the drugs' effectiveness and/or possible side effects.
- Political parties are keenly interested in public opinion polls that indicate how many people agree with their policies or decisions.

Such information, or data, can be collected in various ways, including telephone surveys, questionnaires and the official federal Census (taken every 5 years). Scientific data is collected by recording the results of experiments.

Sampling

Data from the community is usually collected from a **sample** of the population. A selection is taken from a population, data is collected and analysed, and conclusions may then be related to the whole population.

The word **population**, in a statistical sense, implies the total number of persons, places or things being studied.

Examples of samples:

1 A factory producing light globes may produce thousands of globes each day by an automated process. The need to know that the globes meet certain standards of quality control. Obviously it is not practical to test every light globe, so only a small percentage are checked. It is important to check globes produced by each machine; otherwise the results could be inaccurate or give a false impression.

2 An opinion poll is conducted to assess the popularity of the State Premier of NSW. A random sample of 200 voter are chosen and asked to complete a questionnaire. The results are usually expressed as percentages, and are used as an indication of the views of the entire voting population in NSW.

Census

Sometimes, rather than taking a sample, the whole population is surveyed. This is called a census.

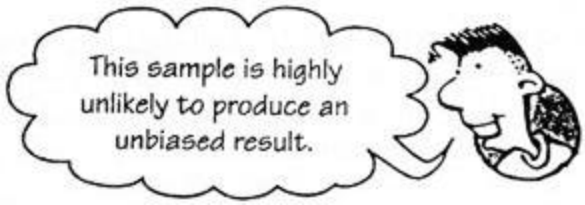
The Australian government conducts a National Census every 5 years, to gather statistical data about every member of the population. It finds out the total population of towns, cities and states, their ages, how many people own a car and other information the government may need to know.

A state or federal election or referendum is also a form of census. Every person eligible to vote is asked to express their opinion.

Bias in surveys

Care needs to be taken when planning and conducting a survey, to ensure that the results are not biased or misleading. Some ways of manipulating a survey to support a particular outcome are:

Choosing a biased sample: The group selected for the survey many not be representative or typical of the large population. For example, a telephone company wants to introduce timed local phone calls. It conducts a survey of people waiting in a queue to use a public telephone.

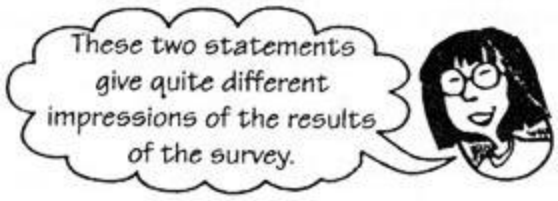


Asking leading question: The writer of a survey can lead people to give a wanted response. For example, compare:
'Australians play a lot of sport?' Do you agree?' and
'Do you think Australians play a lot of sport?'
People are likely to quickly answer 'Yes' to the first question. They are more likely to give a considered answer to the second.

Interpreting the data unfairly: The interpretation of the results of a survey can also be biased. For example, in a survey that produced the results:

Agree 50.5% *Disagree 49.5%*

The results could be interpreted as:
'The majority of people agree.' or
'People are fairly evenly divided.'



Source: *New Course Mathematics Year 8,* Bigelow, Stone & Steenson, Macmillan 1999.

.

WORD EXPLORER

TASK 1 *Vocabulary Building*

Given below is a list of Bahasa Melayu equivalents for some of the words and phrases found in the reading text. Read the text and find the English language equivalents.

WORD IN BAHASA MELAYU	THE ENGLISH EQUIVALENT
kesedaran	
perkembangan dan pergerakan penduduk	
keputusan ujian	
menilai	
keberkesanan	
kesan sampingan	
seluruh	
piawai	
kawalan mutu	
rawak	
peratus	
ditinjau	
banci	
mengumpul	
contohan pincang	

CONNECTING WITH TEXT

TASK 2 *Comprehension of the Text*

Read the text on ***"Using Statistics"*** again and answer the following questions.

1. How does statistics aid in the location of public amenities?
2. How may a pharmaceutical firm use statistical information?
3. Of what use is statistical data to political parties?
4. Why is sampling used in the collection of data?
5. Why would a check of one machine's globe production produce inaccurate results and give a false impression? How should it be done?
6. How is a census different from a sampling?
7. Why do you think there is bias in surveys? What are you sentiments about this?
8. Do you think there is bias in the statistics produced and published in your own working environments? Please explain.

LANGUAGE IN ACTION

TASK 3 *Focus on Grammar*

1. Study the text ***Using Statistics*** and
   (a) *Underline all the passive forms in the text.*
   (b) *Identify the constituents (parts) of the passive form and work out the "rule".*
   (d) *Find out which is the next most frequent tense form after the passive forms.*

2. *What conclusion can you draw about the purpose of the text and the more common tense forms found in it? How can you verify this?*

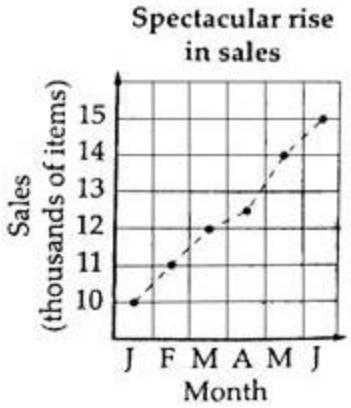
TASK 4 *Presenting & Interpreting Data*

Often, graphic representations of date are used to support claims and these can be quite misleading. In your own groups, examine the following graphic representations carefully and say why they are misleading.

1. *The manufacturer of Freshair air freshener produced this graph to support its claim that Freshair was "twice as sweet as any other brand". Do you think Graph 1 accurately reflects this claim? Support your stand.*

2. *A company used Graph 2 to support its claim of a "Spectacular rise in sales" during an advertising campaign. The sales did rise 50% but the graph can be misleading. Explain why.*

GRAPH 1



GRAPH 2

SPRINGBOARD

Group Work

Lewis Carroll is not only a famous author but was an accomplished mathematician as well. Given below is his Pillow Problem. See if you can solve it. If you can, then explain and justify you answer.

LEWIS CARROL'S PILLOW PROBLEM

A bag contains a counter, known to be either white or black. A white counter is put in, the bag is shaken and a counter is drawn out, which proves to be white. What is now the chance of drawing a white counter?

M. Gardner, Mathematical Circus

Here's another problem. Try solving it.

MONTHLY HALL DILEMMA

Suppose you are on a game show, and you are given the choice of three doors. Behind one door is a car, behind the others goats. You pick a door, say number 1, and the host, who knows what's behind the doors, open another door, say number 3, which has a goat. He says to you, "Do you want to pick door number 2? It is to you advantage to switch your choice of doors?

Craig F. Whitaker, Columbia, MD

Source: An Adventure in Maths
http://www.cut-the-knot.com/hall.shtml

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

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

PLAN

Script the lesson phases as you would carry these out in the classroom. Include the actual language that you would use in the classroom in your lesson notes.

DELIVER

Teach the lesson that you have prepared.

CHECKLIST FOR PEER FEEDBACK

Language Focus of Module:

Name of Teacher:

Subject / Topic: Class:

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

Items	Scale
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. The teacher is able to use appropriate language to respond to students.	1……2……3……4

Interesting expressions used:

Alternative expressions that could be used:

General comments:

CHECKLIST FOR PEER FEEDBACK

Language Focus of Module:

Name of Teacher:

Subject / Topic: Class:

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

Items	Scale
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. The teacher is able to use appropriate language to respond to students.	1……2……3……4

Interesting expressions used:

Alternative expressions that could be used:

General comments:

CHECKLIST FOR PEER FEEDBACK

Language Focus of Module:

Name of Teacher:

Subject / Topic: Class:

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

Items	Scale
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. The teacher is able to use appropriate language to respond to students.	1……2……3……4

Interesting expressions used:

Alternative expressions that could be used:

General comments:

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.

Area identified for attention	Action planned	Action taken	Achievement

How do you feel?

Please mark the spot between the two face 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 face that represents your feeling 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:

X for beginning of the module
Y at the end of day one
Z at the end of day two.

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

STEPPING OUT

There are five language sessions in this module. Reflect on the task 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

Areas	**1**	**2**	**3**	**4**	**Comments**
TEXT LAB					
Word Explorer					
Task					
Task					
Connecting with text Task					
Task					
Task					
Language in Action Task					
Task					
Springboard					
LANGUAGE LAB 1					
Grammar works Task					
Task					
Getting it right Task					
Task					
Trying it out Task					
Task					
Task					
LANGUAGE LAB 2					
Grammar Works					
Task					
Task					
Getting it right Task					
Task					
Trying it out Task					
Task					
STAND AND DELIVER					
Task					

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)

(√) Area/s that need attention	Action plan
Speaking ( ) Reading ( ) Vocabulary ( ) Grammar ( )	Time frame Thing to work on Thing to do Thing 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 require 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)

(√) 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. **Thing I tried** 1. Read *Collins Cobuild Students Grammar*. Harper Collins 1991. 2. Practised Exercise B, p 59: Score: 67/100

SAMPLE 2

HELPING MYSELF

Based on the module that you have just completed or your own language needs, identify an area that you feel require 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)

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 times. **Things to do** 1. Identify someone who will collaborate with me. 2. Select a topic to talk about e.g. newspaper item 3. Identify and practice useful phrases to be used for conversation. 4. Ask for feedback on pronunciation. **Thing I tried** Talked to the colleague 2 times. Learned to pronounce 5 new words. Learned 4 new useful phrases.