

ENGLISH FOR SCIENCE AND TECHNOLOGY

This book was created to address several academic writing issues faced by professional laborers (lecturers, teachers, candidates, etc.), university students, and senior high school students. The author thinks that everyone who reads this book slowly and uses the skills it offers will be able to explore their thoughts in academic writing with ease.

Ten sections comprise the contents of this book: writing process; sentence variety; paragraph format; fact and opinion; cause and effect; comparison and contrast; definition; references and quotation; effective writing; outlining an essay; essay writing; and writing model. Each section includes expert-provided exercises and some theories. It is beneficial for novices who wish to hone and assess their essay writing abilities. Apart from that, it also requires some critical advice from readers to be revised in the next edition.



Anggota IKAPI No.115/JTI/09
Jl. Palmerah XIII N29B, Vila Gunung Buring,
Malang 65138
Website <http://www.winekamedia.net>
E-mail : winekamedia@gmail.com
WA: 0812 3485 7381



ENGLISH FOR SCIENCE AND TECHNOLOGY Dr. Rachmat Setiawibawa, S.I.P., M.M., M.Tr.(Han), dkk.

ENGLISH FOR SCIENCE AND TECHNOLOGY



Science



Technology

AUTHORS:

Dr. Rachmat Setiawibawa, S.I.P., M.M., M.Tr.(Han)
T. D. Siwi Candra Widiyati, S. E., S. Pd., M. Pd.
Yudo Susantyo, S.S.

CORRESPONDING AUTHOR:

Ira Maria Fran Lumbanbatu, S.Pd., M.Hum.



ENGLISH FOR SCIENCE AND TECHNOLOGY

ENGLISH FOR SCIENCE AND TECHNOLOGY

AUTHORS:

Dr. Rachmat Setiawibawa, S.I.P., M.M., M.Tr.(Han)

T. D. Siwi Candra Widiyati, S. E., S. Pd., M. Pd.

Yudo Susantyo, S.S.

EDITORS:

Dekki Widiatmoko

Muhammad Iman Hidayat

CORRESPONDING AUTHOR:

Ira Maria Fran Lumbanbatu, S.Pd., M.Hum.



ENGLISH FOR SCIENCE AND TECHNOLOGY

AUTHORS:

Dr. Rachmat Setiawibawa, S.I.P., M.M., M.Tr.(Han)

T. D. Siwi Candra Widiyati, S. E., S. Pd., M. Pd.

Yudo Susantyo, S.S.

EDITORS:

Dekki Widiatmoko

Muhammad Iman Hidayat

CORRESPONDING AUTHOR:

Ira Maria Fran Lumbanbatu, S.Pd., M.Hum.

ISBN 978-623-437-037-9



Cetakan Pertama : Februari 2024

Penerbit



WINEKA MEDIA

Anggota IKAPI No.115/JTI/09

Jl. Palmerah XIII N29B, Vila Gunung Buring,

Malang 65138

Website <http://www.winekamedia.net>

E-mail :winekamedia@gmail.com

WA: 0812 3485 7381

PREFACE

This book was created to address several academic writing issues faced by professional laborers (lecturers, teachers, candidates, etc.), university students, and senior high school students. The author thinks that everyone who reads this book slowly and uses the skills it offers will be able to explore their thoughts in academic writing with ease.

Ten sections comprise the contents of this book: writing process; sentence variety; paragraph format; fact and opinion; cause and effect; comparison and contrast; definition; references and quotation; effective writing; outlining an essay; essay writing; and writing model. Each section includes expert-provided exercises and some theories. It is beneficial for novices who wish to hone and assess their essay writing abilities. Apart from that, it also requires some critical advice from readers to be revised in the next edition.

CONTENTS

| | |
|---|----|
| PREFACE | i |
| CONTENTS | ii |
| UNIT I. SCIENCE AND TECHNICAL ARTICLES | 1 |
| 1. Reading Text | 1 |
| 2. Describing Angles, Lines and Shape | 4 |
| 3. Evaluation | 6 |
| UNIT II. CONDUCTING A SCIENCE TOPIC | 8 |
| 1. Conducting a Science Topic | 8 |
| 2. Reading Mathematical Formulae | 15 |
| 3. Evaluation | 17 |
| UNIT III. PARAGRAPH DEVELOPMENT | 21 |
| 1. Conveying and Organizing Ideas in Sentence and Paragraph | 21 |
| 2. Exercises | 24 |
| UNIT IV. SCIENCE WRITING | 26 |
| 1. How to Write Essay or Academic for Scientific and Technical Writer | 26 |
| 2. Evaluation | 30 |
| UNIT V. SCIENTIFIC WRITING GRAMMAR | 32 |
| 1. Word Formation | 32 |
| 2. Writing | 35 |
| 3. Reading | 37 |
| 4. Evaluation | 38 |

| | |
|--|----|
| UNIT VI. COMPARISON AND CONTRAST | 40 |
| 1. Comparison and Contrast | 40 |
| 2. Guided Writing | 44 |
| 3. Paragraph Development | 45 |
| 4. Reading | 45 |
| 5. Evaluation | 47 |
| UNIT VII. SCIENCE WRITING 2 | 49 |
| 1. Defining, Emphasizing, Generalizing, and Paraphrasing Words or Sentences | 49 |
| 2. Dialogue | 52 |
| 3. Evaluation | 55 |
| UNIT VIII. SCIENCE WRITING 3 | 57 |
| 1. Paraphrasing | 57 |
| 2. Reading | 61 |
| 3. Evaluation | 63 |
| UNIT IX. ABBREVIATION, PREFIXES, AND SUFFIXES | 66 |
| 1. Abbreviation, Prefixes, and Suffixes | 66 |
| 2. Evaluation | 75 |
| UNIT X. FINAL EVALUATION | 76 |
| 1. Reading | 76 |
| BIBLIOGRAPHY | 79 |
| AUTHOR BIODATA | 80 |

UNIT I

SCIENCE AND TECHNICAL ARTICLES

1. Reading Text

Power Station Types

A power plant or a power generating station, is basically an industrial location that is utilized for the generation and distribution of **electric power** in a mass scale, usually in the order of several 1000 Watts. These are generally located in the sub-urban regions or several kilometers away from the cities or the load centers, because of their requisites like huge land and water demand, along with several operating constraints like waste disposal, etc. For this reason, a power generating station has to not only take care of efficient generation but also the fact that the power is transmitted efficiently over the entire distance and that's why, the **transformer** switch yard to regulate transmission **voltage** also becomes an integral part of the power plant. At the center of it, however, nearly all power generating stations have an AC generator or an **alternator**, which is basically a rotating machine that is equipped to convert energy from the mechanical domain (rotating turbine) into the electrical domain by creating relative motion between a **magnetic field** and the **conductors**. The energy source harnessed to turn the generator shaft varies widely and is chiefly dependent on the type of fuel used.

A power plant can be of several types depending mainly on the type of fuel used. Since for bulk **power generation**, only thermal, nuclear, and **hydropower** come in handy, therefore a power generating station can be broadly classified into the 3 above-mentioned types. Let us have a look at these types of power stations in detail.

A. Thermal Power Station

A thermal power station or a coal-fired **thermal power plant** is by far, the most conventional method of generating **electric power** with reasonably high efficiency. It uses coal as the primary fuel to boil the water available to **superheated steam** for driving the **steam** turbine. The steam turbine is then mechanically coupled to an alternator rotor, the rotation of which results in the generation of electric power. Generally in India, bituminous coal or brown coal are used as fuel of boiler which has volatile content ranging from 8 to 33% and ash content 5 to 16%. To enhance the thermal efficiency of the plant, the coal is used in the **boiler** in its pulverized form.

Advantages of Thermal Power Plants

- Fuel used i.e coal is quite cheaper.
- Initial cost is less as compared to other generating stations.
- It requires less space as compared to hydro-electric power stations.

Disadvantages of Thermal Power Plants

- It pollutes atmosphere due to production of smoke & fumes.
- Running cost of the power plant is more than hydro electric plant.

B. Nuclear Power Station

The nuclear power generating stations are like the thermal stations in more ways than one. However, the exception here is that radioactive elements like uranium and thorium are used as the primary fuel in place of coal. Also, in a nuclear station the furnace and the boiler are replaced by the **nuclear reactor** and the heat exchanger tubes.

For the process of nuclear power generation, the radioactive fuels are made to undergo fission reaction within the nuclear reactors. The fission reaction propagates like a controlled chain reaction and is accompanied by unprecedented amount of energy produced,

which is manifested in the form of heat. This heat is then transferred to the water present in the heat exchanger tubes. As a result, super heated steam at very high temperature is produced. Once the process of steam formation is accomplished, the remaining process is exactly like a thermal power plant, as this steam will further drive the turbine blades to generate electricity.

C. Hydro-Electric Power Station

In Hydro-electric plants the energy of the falling water is utilized to drive the turbine which in turn runs the generator to produce electricity. Rain falling upon the earth's surface has potential energy relative to the oceans towards which it flows. This energy is converted to shaft work where the water falls through an appreciable vertical distance.

This power is utilized for rotating the alternator shaft, to convert it to equivalent electrical energy. An important point to be noted is that the hydro-electric plants are of much lower capacity compared to their thermal or nuclear counterpart. For this reason, hydro plants are generally used in scheduling with thermal stations, to serve the load during peak hours. They in a way assist the thermal or the nuclear plant to deliver power efficiently during periods of peak hours.

Advantages of Hydro Electric Power Station

- It requires no fuel; water is used for generation of electrical energy.
- It is neat and clean energy generation.
- Construction is simple, less maintenance is required.
- It helps in irrigation and flood control also.

Disadvantages Hydro Electric Power Station

- It involves high capital cost due to dam construction.
- Availability of water depends upon weather conditions.
- It requires high transmission cost as the plant is in hilly areas.

So it can be concluded that there are 3 types of power station type that is thermal power station, nuclear power station, and hydro-electric power station and from each type of power station has its own deficiencies and advantages.

2. Describing Angels, Lines and Shape

A. Object

Patterns for asking and answering questions about objects in your classroom, e.g window, door, table, etc.

| | | |
|-----|----------------------|---------------|
| How | long high wide | is this door? |
|-----|----------------------|---------------|

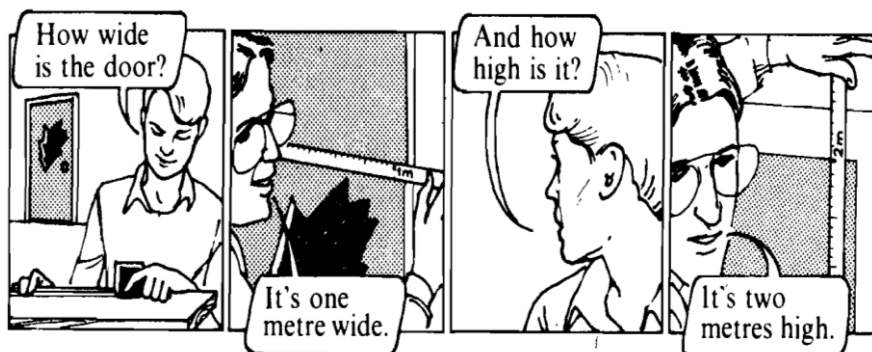
| | |
|------------------|----------------------|
| This door is 1 M | long high wide |
|------------------|----------------------|

| | | |
|-------------|--------------------------|---------------|
| What is the | heigh width length | of this door? |
|-------------|--------------------------|---------------|

| | | |
|-----|--------------------------|---------------------|
| The | heigh width length | of this door is 1 M |
|-----|--------------------------|---------------------|

For example:

Ron is making a new door. Alan is helping him.



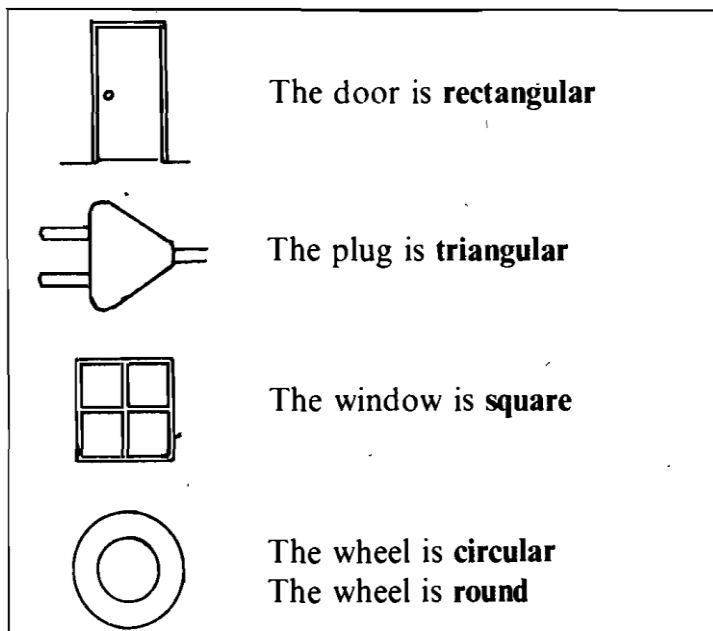
There are three ways of writing this description:

1. A is a solid wooden block 10 cm high, 5 cm long and 2 cm wide
2. A is a solid wooden block. It has a height of 10 cm, a length of 5 cm and a width of 2 cm.
3. A is a solid wooden block of height 10 cm, length 5 cm and width 2 cm.

B. Plane and angles shapes

1) Plane shapes

The first shape is a triangle. Triangles have three sides. The second shape is a square. Squares have four sides. The sides are all equal. The opposite sides are parallel. The third shape is not a square. It is a rectangle. Rectangles also have four sides, but the sides are not all equal. The opposite sides are equal. The opposite sides are equal and parallel. Triangles, squares, and rectangles have straight sides. They are rectilinear shapes. Rectilinear shapes have straight sides. The fourth shape is a circle. A circle is not a rectilinear shape. It is a curvilinear shape. Curvilinear shapes have curved sides.



Angle shapes

All rectilinear shapes have angles. Curvilinear shapes do not have angles. A right angle is 90 degrees. Angle A is a right angle. An acute angle is less than 90 degrees. Angle B is an acute angle. It is 45 degrees. Angle C is an obtuse angle. It is 120 degrees. Angle D is a reflex angle. It is 210 degrees. Square E has four right angles. Squares and rectangles always have four right angles. Triangles F has a right angle. Triangles G does not have a right angle. It has three acute angles.

Equilateral : Triangle which have three sides equal.

Isosceles : Triangle which have two sides equal.

Scalene : Triangle which have no sides equal.

3. Evaluation

Exercise 1. Answer these questions below.

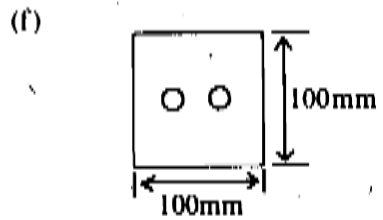
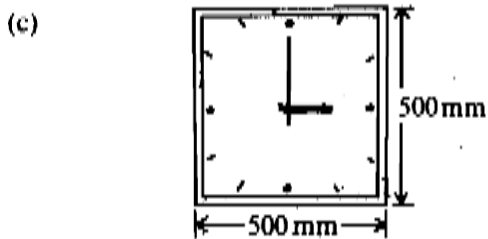
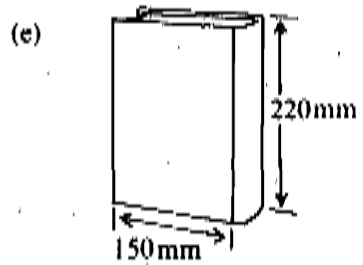
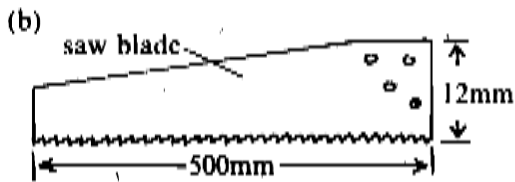
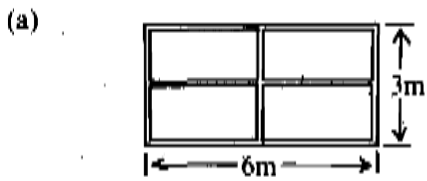
1. What is classified of power station type?
2. what is thermal power station?
3. What is Nuclear power station?
4. What is Advantages dan Disadvantages of hydro-electric power station?
5. What is there to know about power station?

Exercise 2. Some of these statements are true. Some of these statements are not true. They are false. Read the sentences. Are they true or false?

1. The first shape is a triangle.
2. Triangles have four sides.
3. The second shape is a rectangle.
4. A square has four equal sides.
5. A rectangle also has four equal sides.
6. The third shape is not a rectangle.
7. Triangles, rectangles and squares have straight sides.
8. Triangles, rectangles and squares are curvilinear shapes.
9. The fourth shape is not a rectilinear shape.
10. Circles are curvilinear shapes

Exercise 3. Describe the angles of these shapes.

Example: (a) The window is rectangular. It is six metres long and three metres high.



UNIT II

CONDUCTING A SCIENCE TOPIC

1. Conducting a Science Topic

Scientific and technical articles and essays are mainly published in journals, magazines, and newspapers. They are normally intended to reach a wider audience than research papers.

Thinking about your audience

How scientific articles are written depends on who the readers are likely to be. A more scholarly, academic, or discipline-specific journal will allow specialized vocabulary, while a piece in a more popular magazine, for example, will present and explain the data in an accessible manner for a wider audience. The writer must know what kind of people he or she is writing for.

The structure of a scientific article

Articles and essays need to be a seamless whole: paragraph flowing into paragraph, ideas presented smoothly in logical order. Structurally they can be broken down into these three parts:

- the introduction
- the main body
- the conclusion

Research Paper

Research papers are generally written for scientists working in the same field and therefore have a more limited, and more specialized, readership than articles. Research papers can appear in specialist journals or be presented at conferences.

The structure of a research paper

A research paper has a more closely defined structure than an article or essay. There are normally 8 sections in a research paper or scientific report, and these tend to follow each other in a fixed sequence. Obviously, these may vary, depending on the nature of the research done. Each element is further described and explained in Chapter 2 *Composition*.

- **Title**

It must precisely describe the report's contents.

- **Abstract**

A brief overview of the report

- **Introduction**

Includes the purpose of the research, states the hypothesis, gives any necessary background information and provides a review of pertinent literature.

- **Methods and materials**

Provides a description of material, equipment and methods used in the research.

- **Results**

States the results of the research. Visual materials are included here.

- **Discussion**

Evaluation and interpretation. Was the hypothesis supported? If so, how? If not, why not? Relevant results are cited in support.

- **Conclusion**

Conclusions to be drawn from the results, conclusions about the hypothesis, Implications of the research and results also additional research proposed.

▪ **References cited**

A list of the references cited, include references to any works cited in the review of literature in the introduction. Use the documentation style required by your specific field.

Proposals

Proposals may well be the least popular form of writing for researchers, but they are necessary. The purpose of a proposal is to ask for funding to make research possible. As there is only a limited amount of money in the world for research, you need to make the case for your research as effectively as you can.

Purpose of a proposal

A proposal must demonstrate that your research project is worth the time, effort and money to accomplish it. It must make the need for money and time easily understandable, and it must propose an appropriate recipient for the funding.

- A proposal persuades.
- A proposal requests.
- A proposal promises that the project will be completed.
- A proposal states the researcher's commitment to doing the work.
- A proposal presents a detailed plan to accomplish the research.

Components of a proposal

Although there is variation according to the organization you are applying to, a proposal will proUNITly consist of these elements.

A cover letters

This is one page long, separate from the main proposal. It introduces:

- The researchers -- you
- The reason for your research – the needs and the problems that the research is to meet.

- The cost of the research
- The length of the research
- The benefits of the research (including to the prospective donors)

A title pages

The title page is one sheet of paper. It contains:

- The project title.
- The recipient of the proposal, that is, the organization, and if possible, the individual.
- The date
- The person or persons submitting the proposal, including signatures.
- a contact person (name and title, address, telephone number, and e-mail address)
- The project budget total
- The project time span

A table of contents

This is only necessary if the proposal is over 15 pages long. It should be on a single page.

A summary

By its very nature this must be written last. It should only be between 150 and 300 words (2 paragraphs) long and include points in the cover letter.

An introduction

Use the introduction to establish the need for the research and the credibility of the researchers to do it. Include:

- Background on the need to be addressed by the research
- Background on the researchers and their organization (including degrees, titles and achievements)

A needs assessment

This section should answer these questions:

- What is the need motivating the research?
- How is the research expected to meet the need?
- Why should you be the one to do the research? What are your qualifications for it?

Objectives

This section should answer these questions:

- What is the goal of the research?
- What are the expected results?
- What are the expected benefits and applications resulting from the research?
- How do the objectives meet the needs?

Methods

This section should answer these questions:

- How will the research specifically be conducted? Justify the methods proposed.
- What is the timeframe for the research project? Justify the schedule proposed.

Pre-evaluation

This section should answer these questions:

- How will the project be evaluated? Internally or externally?
- What data will be gathered? How will it be gathered?
- What is the expected extended length of the project, beyond the scope of the immediate proposed funding?
- How will the results be disseminated?

Long-term financial plans

The answers in this section should be specific and detailed. This section should answer these questions:

- If the project extends beyond the length of the grant, how will it be funded?
- Will the project be able to be wholly or partially self-supporting?

Budget

This section should answer these questions:

- What materials are needed for the project and what will they cost?
This must be itemized, specific and detailed.

Personnel.

This section should answer these questions:

- Who will be involved in the research, and why? (Be specific)
- What specifically are the duties and responsibilities of the researchers involved?

Appendices.

Each appendix should be a separate section. Possible appendices include:

- Résumés of the researchers
- References
- Board members of applying organizations, or body of researchers
- Charts of the organization
- Letters of support
- Applicable charts, graphs and tables
- Applicable bibliographies

Different ways of ordering your material

| | |
|------------------------------------|---|
| chronological or sequential | Step by step. Points are made one after another in the order of occurrence. |
| from simple to complex | Used when proving an assertion made in the introduction. Each step builds on the one before, from the obvious to the complicated, building the reader's understanding gradually. It builds naturally to a climax in the conclusion. |
| from complex to simple | Used when urging the reader to apply a solution to a problem. It states the problem, and then begins to direct towards a specific solution. |
| from general to specific | Used when contrasting and comparing, from similarity to difference. |
| from specific to general | Used when contrasting and comparing, from difference to similarity. |

Sample phrases you can use in introductions

▪ Stating your purpose

In this paper, it will be shown that ...

In this paper, ... will be discussed/are considered.

The present paper examines/presents ...

In this article, we report on ...

Our/My intention here is to highlight ...

In the following pages, we shall propose ...

This article will concentrate/focus on the arguments ...

The key question that this article will address is whether ...

This paper will report on work already carried out in this area.

▪ Relating your paper to current work.

In recent years, ... has become a topic of lively debate.

The issue of ... has become controversial recently.

The question of ... has been thoroughly researched over the last few years.

▪ **Indicating the structure of your paper**

The article has (6) main sections.

Firstly, we shall examine the question of ...

The next section briefly outlines ...

After a short discussion of ..., an overview of ... will be given.

This will be followed by ...

The final section will present ...

I / We shall then go on to suggest ...

2. Reading Mathematical Formulae

A. Addition

$$2+2=4$$

1. Two plus two is four.
2. Two and two is/equals four.
3. Two added by two is four.

B. Subtraction

$$7-4=3$$

1. Seven minus four is three.
2. Seven take away four is three

C. Multiplication

$$3 \times 4 = 12$$

1. Three fours are twelve.
2. Three multiplied by four equals twelve.
3. Three times four is twelve.

D. Division

$$9:3=3$$

- Nine divided by three equals three.

E. Square

R^2 R squared

X^3 X cubed

10^4 Ten to the power four

3^2 Three squared

3^3 Three cubed

F. Root

$\sqrt{5}$ The squared root of five or root of five

$\sqrt{144} = 12$ The squared root of 144 is 12

$\sqrt[3]{729} = 9$ The cubed root of 729 is 9

G. Plus or minus

± 5 dB Plus or minus 5 decibels

H. Comparison

11:1 Eleven to one

I. Percentage

20% Twenty per cent

J. Greater than

> 10 dB Greater than decibels

K. Less than

< 25 mA Less than twenty-five milliamps

L. Less than or equal

≤ 10 W Less than or equal to ten watts

3. Evaluation

Exercise 1

Example: Water boils (boil) at 100 degrees centigrade

1. Hypermarket.....(open) at 10.00 and.....(close) at 22.00 everyday.
2. What time.....(the cinema/open)
3. `What.....(your father/do ?) `He is a soldier`
4. If you need money, why.....(you/not/get) a job ?
5. I have a car but I.....(not/use) it very often.
6. How many cigarettes.....(you/smoke) a day ?
7. I don't understand the word `deceive`.
What.....(`deceive`/mean)
8. I.....(play) the piano, but I.....(not/play) very well.

Exercise 2

Practice saying/writing these numbers.

- | | |
|------------------------|----------------------|
| 1. $98 : 2.5 =$ | 11. 88.987 |
| 2. $335 \times 25\% =$ | 12. $14/23$ |
| 3. $989 + \sqrt{144}$ | 13. $1/78$ |
| 4. 2,820 | 14. $1/15$ |
| 5. 10,222 | 15. $66/78$ |
| 6. 878,980 | 16. $67 \frac{2}{3}$ |
| 7. 2,897,907 | 17. $102/131$ |
| 8. 0.00009 | 18. $2 \frac{3}{5}$ |
| 9. 999.987 | 19. 33.7665 |
| 10. 88,987 | 20. 333,302 |

Exercise 3. Read this reading text then answer the questions

HYBRID WAR

Hybrid war (hybrid war) is a military strategy that mixes conventional wars, irregular wars, and cyber war. In this war, by combining kinetic operations with subversive efforts, the aggressors intend to avoid attribution or retribution. There are various terms that are often used to refer to the concept of hybrid war, namely: hybrid war, hybrid warfare, hybrid threat, or hybrid adversary. American military agencies tend to speak within the framework of "hybrid threats", while academic literature talks about "hybrid warfare". In this article, both terms can be used alternately in the same sense.

Conventional warfare is a form of warfare conducted by using conventional weapons and battlefield tactics between two or more states in open confrontation. The forces on each side are well-defined, and fight using weapons that primarily target the opponent's military. It is normally fought using conventional weapons, and not with chemical, biological, or nuclear weapons. The general purpose of conventional warfare is to weaken or destroy the opponent's military, thereby negating its ability to engage in conventional warfare. In forcing capitulation, however, one or both sides may eventually resort to unconventional warfare tactics.

Modern hybrid war that simultaneously combines conventional, irregular, and terrorist components is a complex challenge that requires an adaptable and versatile military to overcome. The United States has increasingly focused on counterinsurgency doctrine in the wake of its wars in Iraq and Afghanistan. On the contrary, the commander of a military fighting a hybrid war will need to leverage a wide range of capabilities including conventional high-intensity conflict units, decentralized special operations forces, and sophisticated information operations and technology platforms. The concept of hybrid war is not new, but its means are increasingly sophisticated and deadly, and require a response in kind.

Irregular warfare is often characterized as warfare in which one or more combatants are irregular military rather than regular forces. This is because the two most commonly understood forms, insurgency and terrorism both involve non-state actors. But irregular warfare is distinguished from traditional warfare not by the parties involved, but rather by the focus of the participants on swaying some population to their side. In US military doctrine, irregular warfare is defined "A violent struggle among state and non-state actors for legitimacy and influence over the relevant populations". The overuse of the term 'warfare' in contemporary military terminology to describe both a specific type of engagement and the type of forces participating in it can lead to false conclusions. A guerrilla unit that is made of commandos is a regular unit conducting asymmetric warfare whereas an irregular band of fighters can engage combat in a tactical infantry firefight if well led and well equipped, fighting like a conventional unit. Irregular warfare favors indirect and asymmetric warfare approaches, though it may employ the full range of military and other capabilities, in order to erode the adversary's power, influence, and will. It is inherently a protracted struggle that will test the resolve of a state and its strategic partners. Concepts associated with irregular warfare are older than the term itself.

Cyberwarfare involves the use and targeting of computers and networks in warfare. It involves both offensive and defensive operations pertaining to the threat of cyberattacks, espionage and sabotage. There has been controversy over whether such operations can duly be called "war". Nevertheless, nations have been developing their Capabilities and engaged in cyberwarfare either as an aggressor, defendant, or both. Cyberwarfare has been defined as "actions by a nation-state to penetrate another nation's computers or networks for the purposes of causing damage or disruption", but other definitions also include non-state actors, such as terrorist groups, companies, political or ideological extremist groups, hackers, and transnational criminal organizations.

Some governments have made it an integral part of their overall military strategy, with some having invested heavily in cyberwarfare capability. Cyberwarfare is essentially a formalized version of penetration testing in which a government entity has established it as a warfighting capability.

This capability uses the same set of penetration testing methodologies but applies them, in the case of United States doctrine, in a strategical way to

- Prevent cyber attacks against critical infrastructure.
- Reduce national vulnerability to cyber attacks.
- Minimize damage and recovery time from cyber attacks.

Offensive operations are also part of these national level strategies for officially declared wars as well as undeclared secretive operations.

So that is the kind of war that exists in the world all that will continue to evolve with the times. Addressing these threats will require more agile military organizational capabilities and personnel to prevent information operations, electronic warfare (EW) and cyberspace action in hybrid wars in peacetime does not trigger military conflicts.

Bond, Margaret S. (2007). Hybrid War: A New Paradigm for Stability Operations in Failing States

Questions

1. What is the meaning of hybrid war?
2. What is the meaning of conventional warfare?
3. What is used in conventional wars?
4. What kind of war involving a terrorist component in its implementation?
5. What is the purpose of government in mastering the ability in the field of cyberwarfare?

UNIT III

PARAGRAPH DEVELOPMENT

1. Conveying and Organizing Ideas in Sentence and Paragraph

A paragraph is a group of related sentences that support one main idea. In general, paragraphs consist of three parts: the topic sentence, body sentences, and the concluding or the bridge sentence to the next paragraph or section. Paragraphs show where the subdivisions of a research paper begin and end and, thus, help the reader see the organization of the essay and grasp its main points.

The purpose of a piece of scientific writing paragraph is to present information clearly and concisely so that it can be easily understood. Clarity therefore begins with the title. In scientific and technical writing, a poetic or stylized title does not help the reader at all. For example, the following title

The Kopje Drummers of the Karoo

does not tell the reader that the paper is about birds, woodpeckers to be exact. However, this title

The mating rituals of Geocolaptes olivaceus, South Africa's Ground Woodpecker

tells the reader very clearly what the subject of the paper is.

Elements in a title

In technical and scientific writing, the title is a precise description of the contents. It should include specific words to indicate the following:

- a. the topic, that is, the main, general subject you are writing about.
- b. the focus, that is, a detailed narrowing down of the topic into the particular, limited area of your research
- c. optionally, for a scientific article, the purpose of your writing. This means including a word such as the following, which tells the reader what kind of argumentation to expect:

An analysis of.. An assessment of.. A comparison of...A description of ...

A discussion of ... An evaluation of ... An explanation of ... An outline of ...

Some sample titles:

| purpose | topic | focus |
|------------------|--------------------------------|--|
| An analysis of | carp culture management | as a tool for Mexican crayfish conservation. |
| An overview of | nutritional needs | before, during and after an endurance event. |
| A discussion of | genetic engineering technology | and its effects on the environment. |
| An evaluation of | sewage treatment | as a tool in environmental protection. |

Development and Organization

Before you can begin to determine what the composition of a particular paragraph will be, you must consider what is the most important idea that you are trying to convey to your reader. This is the "controlling idea," or the thesis statement from which you compose the remainder of the paragraph. In other words, your paragraphs should remind your reader that there is a recurrent relationship between your controlling idea and the information in each paragraph. The research problem functions like a seed from which your paper, and your ideas, will grow. The whole process of paragraph development is an organic one—a natural

progression from a seed idea to a full-blown research study where there are direct, familial relationships in the paper between all of your controlling ideas and the paragraphs which derive from them.

The decision about what to put into your paragraphs begins with brainstorming about how you want to pursue the research problem. There are many techniques for brainstorming but, whichever one you choose, this stage of paragraph development cannot be skipped because it lays a foundation for developing a set of paragraphs [representing a section of your paper] that describes a specific element of your overall analysis. Each section is described further in this writing guide.

Given these factors, every paragraph in a paper should be:

- **Unified**—All of the sentences in a single paragraph should be related to a single controlling idea [often expressed in the topic sentence of the paragraph].
- **Clearly related to the research problem**—The sentences should all refer to the central idea, or the thesis, of the paper.
- **Coherent**—The sentences should be arranged in a logical manner and should follow a definite plan for development.
- **Well-developed**—Every idea discussed in the paragraph should be adequately explained and supported through evidence and details that work together to explain the paragraph's controlling idea.

There are many different ways you can organize a paragraph. However, the organization you choose will depend on the controlling idea of the paragraph. Ways to organize a paragraph in academic writing include:

- **Narrative:** Tell a story. Go chronologically, from start to finish.
- **Descriptive:** Provide specific details about what something looks or feels like. Organize spatially, in order of appearance, or by topic.

- **Process:** Explain step by step how something works. Perhaps follow a sequence—first, second, third.
- **Classification:** Separate into groups or explain the various parts of a topic.
- **Illustrative:** Give examples and explain how those examples prove your point.

2. Exercises

Exercise 1

Examples: `Somebody hit me`

Who hit you?

`I hit somebody`

Who did you hit?

- | | |
|--------------------------------|------------|
| 1. Something happened. | What.....? |
| 2. Someone lives in that house | Who.....? |
| 3. Somebody gave me this key | Who.....? |
| 4. Henry gave me something | What.....? |
| 5. Tom meets someone every day | Who.....? |
| 6. I fell over something. | What.....? |
| 7. Something fell on the floor | What.....? |
| 8. This word means something | What.....? |

Exercise 2

Example: Tom usually gets up at 7.30. Yesterday he got up at 7.30

1. John usually wakes up early. Yesterday morning.....
2. Tom often walks to work. Yesterday.....
3. Ann never late for work. Yesterday.....
4. George usually sleeps very well. Last night.....
5. Bambang often goes out in the evening. Yesterday evening.....

Exercise 3

Example: Where/go?

Where did you go ?

- | | |
|-------------------------|-------|
| 1. How long/stay there? | |
| 2. Stay in a hotel? | |

3. Go alone?
4. How/travel?
5. The weather/fine?
6. What/do in the evenings?
7. Meet any interesting people?.....

Exercise 4

Read the following sentences. Underline the subjects and circle the prepositional phrases.

1. The gym is open until nine o'clock tonight.
2. The student with the most extra credit will win a homework pass.
3. Maya and Tia found an abandoned cat by the side of the road.
4. The driver of that pickup truck skidded on the ice.
5. Anita won the race with time to spare.
6. The people who work for that company were surprised about the merger.
7. Working in haste means that you are more likely to make mistakes.
8. The soundtrack has over 60 songs in languages from around the world.
9. His latest invention does not work, but it has inspired the rest of us.

UNIT IV

SCIENCE WRITING

1. How to Write Essay or Academic for Scientific and Technical Writer

Essay or academic writing is, essentially, the writing you have to do for your university courses. Your instructors may have different names for academic writing assignments (essay, paper, research paper, term paper, argumentative paper/essay, analysis paper/essay, informative essay, position paper), but all of these assignments have the same goal and principles.

A. Clear Purpose

The goal of your paper is to answer the question you posed as your topic. Your question gives you a purpose. The most common purposes in academic writing are to persuade, analyze/synthesize, and inform.

1) Persuasive purpose.

In persuasive academic writing, the purpose is to get your readers to adopt your answer to the question. So you will choose one answer to your question, support your answer using reason and evidence, and try to change the readers' point of view about the topic. Persuasive writing assignments include argumentative and position papers.

2) Analytical purpose

In analytical academic writing, the purpose is to explain and evaluate possible answers to your question, choosing the best answer(s) based on your own criteria. Analytical assignments often investigate causes, examine effects, evaluate

effectiveness, assess ways to solve problems, find the relationships between various ideas, or analyze other people's arguments. The "synthesis" part of the purpose comes in when you put together all the parts and come up with your own answer to the question. Examples of these assignments include analysis papers and critical analyses.

3) Informative purpose

In informative academic writing, the purpose is to explain possible answers to your question, giving the readers new information about your topic. This differs from an analytical topic in that you do not push your viewpoint on the readers, but rather try to enlarge the readers' view.

Some assignments will have a pre-determined purpose (see the examples above); for other assignments, you will have to choose a purpose when you choose a topic (research paper, term paper). And some assignments may have two purposes. In all cases, the purpose will be clear at the beginning of your paper, and your paper must achieve its purpose in order to be successful.

C. Audience Engagement

As with all writing, academic writing is directed to a specific audience in mind. Unless your instructor says otherwise, consider your audience to be fellow students with the same level of knowledge as yourself. As students in the field, they are interested in your topic, but perhaps not so interested in reading a paper. So you will have to engage them with your ideas and catch their interest with your writing style. Imagine that they are also skeptical, so that you must use the appropriate reasoning and evidence to convince them of your ideas.

D. Clear Point of View

Academic writing, even that with an informative purpose, is not just a list of facts or summaries of sources. Although you will present other people's ideas and research, the goal of your paper is to show

what you think about these things. Your paper will have and support your own original idea about the topic. This is called the thesis statement, and it is your answer to the question.

D. Single Focus

Every paragraph (even every sentence) in your paper will support your thesis statement. There will be no unnecessary, irrelevant, unimportant, or contradictory information (Your paper will likely include contradictory or alternative points of view, but you will respond to and critique them to further strengthen your own point of view).

E. Logical Organization

Academic writing follows a standard organizational pattern. For academic essays and papers, there is an introduction, body, and conclusion. Each paragraph logically leads to the next one.

- 1) The introduction catches the readers' attention, provides background information, and lets the reader know what to expect. It also has the thesis statement.
- 2) The body paragraphs support the thesis statement. Each body paragraph has one main point to support the thesis, which is named in a topic sentence. Each point is then supported in the paragraph with logical reasoning and evidence. Each sentence connects to the one before and after it. The readers do not have to work to find the connection between ideas.
- 3) The conclusion summarizes the paper's thesis and main points and shows the reader the significance of the paper's findings.

F. Strong Support

Each body paragraph will have sufficient and relevant support for the topic sentence and thesis statement. This support will consist of facts, examples, description, personal experience, and expert opinions and quotations.

G. Clear and Complete Explanations

This is very important! As the writer, you need to do all the work for the reader. The reader should not have to think hard to understand your ideas, logic, or organization. English readers expect everything to be done for them; your thoughts and thought processes should be clearly and completely explained.

H. Effective Use of Research

Your paper should refer to a variety of current, high-quality, professional and academic sources. You will use your research to support your own ideas; therefore, it must be integrated into your writing and not presented separately. That means that source material will be introduced, analyzed, explained, and then cited. Research and APA Style Guide 2010 covers this topic in depth.

I. Correct APA Style

All academic papers should follow the guidelines of the American Psychological Association as found in Research and APA Style Guide 2010, regarding in-text citations, the reference list, and format.

J. Writing Style

Because this is your work, you should use your own words whenever possible. Do not try to write like a boring, overly formal scholarly article. Use the natural conversational style that you would use in the classroom. Your writing should be clear, concise, and easy to read. It is also very important that there is no grammar, spelling, punctuation, or vocabulary mistakes in academic writing. Errors convey to the reader that you do not care.

You've just received your first academic writing assignment. What do you do? If you are a beginning writer, take it step by step. The following writing process has worked for millions of university students.

1. Choose a topic.
2. Think (brainstorm).
3. Research.
4. Discover your thesis.
5. Plan (outline).
6. Write.
7. Revise.
8. Edit.
9. Proofread.

2. Evaluation

Exercise 1.

Error identification – Extra practice exercises. Decide which part of the sentence is grammatically incorrect. Then look at the answers below.

1. I enjoyed study geography at school and now I've enrolled at the Economics Faculty.
2. I used to be keen of all scientific subjects but now I would prefer to study art.
3. I want meet your sister when she comes to see you – she sounds very nice.
4. My friends tell the English exam is quite difficult but I'm not worried.
5. The tickets, which are extremely good value, can be buy from large supermarkets.

Exercise 2

Read the first example and then compare these ferrous metals use the words more, most, or less and least.

**e.g. medium carbon steels
cast iron
low carbon steels**

**not very elastic
not at all elastic
quite elastic**

➔ Low carbon steels are more elastic than medium carbon steels, but cast iron is the least elastic of these metal

1. High carbon steels not very malleable
 cast iron not at all malleable
 Low carbon steels quite malleable
2. The steels elastic
 Wrought iron very elastic
 Cast iron not elastic
3. Cast iron very poor elasticity
 High carbon steels poor elasticity
 The steels elastic
4. The steels 0.08 – 1.50%
 wrought iron 0.05% carbon
 Cast iron 2-5% carbon

Then make a short article about the ferrous metals. Use simple and compound sentences for comparison and contrast, also connected sentences using connectors or transitional phrases. You can use the 4 comparison sentences for your writing.

UNIT V

SCIENTIFIC WRITING GRAMMAR

1. Word Formation

A. Noun Formation

Verb words with suffix **-sis, -ure, -y, -ence, -ance, -al, -age, -sion,-ment, -tion, -ion and -ation.**

| VERB | NOUN (-sis) | VERB | NOUN (-ure) |
|-------------|--------------------|-------------|--------------------|
| Emphasize | emphasis | sign | signature |
| Hypnotize | hypnotis | seize | seizure |
| Analyse | analysis | fail | failure |
| Paralyse | paralasis | close | closure |
| Diagnose | diagnosis | enclose | enclosure |

| VERB | NOUN (-y) | VERB | NOUN (-ence) |
|-------------|------------------|-------------|---------------------|
| Injure | injury | offend | offence |
| Discover | discovery | defend | defence |
| Apologize | apologizy | pretend | pretendence |
| Deliver | delivery | depend | dependence |
| Recover | recovery | differ | difference |

| VERB | NOUN (-ance) | VERB | NOUN (-al) |
|-------------|---------------------|-------------|-------------------|
| Annoy | annoyance | propose | proposal |
| Resist | resistance | try | trial |
| Avoid | avoidance | survive | survival |
| Endure | endurance | arrive | arrival |
| Accept | acceptance | remove | removal |

| | | | |
|-------------|--------------------|-------------|--------------------|
| VERB | NOUN (-age) | VERB | NOUN(-sion) |
| Use | usage | divide | division |
| Store | storage | expand | expansion |
| Leak | leakage | explode | explosion |
| Pass | passage | include | inclusion |
| Break | breakage | conclude | conclusion |

| | | | |
|-------------|---------------------|-------------|---------------------|
| VERB | NOUN (-ment) | VERB | NOUN (-tion) |
| Entertain | entertainment | introduce | introduction |
| Improve | improvement | produce | production |
| Arrange | arrangement | pronounce | pronunciation |
| Advertise | advertisement | repeat | repetition |
| Enlarge | enlargement | compete | competition |

| | | | |
|-------------|--------------------|-------------|-----------------------|
| VERB | NOUN (-ion) | VERB | NOUN (- ation) |
| Prevent | prevention | investigate | Investigation |
| Interrupt | interruption | operate | operation |
| Elect | election | imagine | imagination |
| Protect | protection | communicate | communication |
| Suggest | suggestion | prepare | preparation |

Adjective words with suffix –ence, -ance, -cy, -ity, -ness, -y, and -iness

| | | | |
|-------------|---------------------------|------------|-------------------|
| ADJ | NOUN (-ence,-ance) | ADJ | NOUN (-cy) |
| Confident | confidence | private | privacy |
| Independent | independence | urgent | urgency |
| Reluctant | reluctancy | vacant | vacancy |
| Arrogant | arrogance | fluent | fluency |
| Elegant | elegance | frequent | frequency |

| | | | |
|------------|--------------------|------------|---------------------|
| ADJ | NOUN (-ity) | ADJ | NOUN (-ness) |
| Popular | popularity | bald | baldness |
| Similar | similarity | foolish | foolishness |
| Valid | validity | kind | kindness |
| Equal | equality | weak | weakness |
| Real | reality | ill | illness |

| ADJ | NOUN (-y) | ADJ | NOUN (-iness) |
|------------|------------------|------------|----------------------|
| Jealous | jealousy | happy | happiness |
| Loyal | loyalty | tidy | tidiness |
| Difficult | difficulty | lazy | laziness |
| Safe | safely | holy | holiness |
| Royal | royalty | lonely | loneliness |

B. Adjective Formation

Noun words with suffix –ly, -ous, -ic and –ical.

| NOUN | ADJ (-ly) | NOUN | ADJ (-ous) |
|-------------|------------------|-------------|-------------------|
| Salt | salty | poison | poisonous |
| Grass | grassy | adventure | adventurous |
| Rain | rainy | mountain | mountainous |
| Friend | friendly | danger | dangerous |
| Week | weekly | glory | glorious |

| NOUN | ADJ (-ic) | NOUN | ADJ (-ical) |
|-------------|------------------|-------------|--------------------|
| Alcohol | alcoholic | grammar | grammatical |
| Energy | energetic | music | musical |
| Sympathy | sympathetic | practice | practical |
| Drama | dramatic | alphabet | alphabetical |
| Poetry | poetic | theatre | theatrical |

C. Verb words with suffix –able and -ive

| VERB | ADJ (-able) | NOUN | ADJ (-ive) |
|-------------|--------------------|-------------|-------------------|
| Change | changeable | destroy | destructive |
| Accept | acceptable | attract | attractive |
| Suit | suitable | produce | productive |
| Read | readable | protect | protective |
| Break | breakable | inform | informative |

D. Verb Formation

Adjective words with suffix –en

| ADJ | VERB (-en) |
|-----|------------|
|-----|------------|

| | |
|-------|---------|
| Sharp | sharpen |
|-------|---------|

| | |
|-------|---------|
| Sweet | sweeten |
|-------|---------|

| | |
|------|--------|
| Dark | darken |
|------|--------|

| | |
|--------|----------|
| Bright | brighten |
|--------|----------|

| | |
|------|-------|
| Ripe | ripen |
|------|-------|

2. Writing

NOUN + VERB + ADVERB/PREPOSITIONAL PHRASE

Prof. Ober lives in Chicago. He lives on a street near his university. He has lived there for many years. Every day he teaches and he works in his office. His classes meet on Mondays, Wednesdays, and Fridays. On Tuesdays and Thursdays, he studies in his office and in the library. He talks with his students. He reads every day for pleasure and relaxation. He reads about life in the sea.

Guided Writing

A Answer the following questions orally by using adverbs or prepositional phrases. Then write your answers in paragraph form.

When does Prof. Ober work?

He works every day.

Prof. Ober`s Day

Where is Prof. Ober working now? How has he worked today? When will he finish? What will he do then? Where will he drive? How far does he live from his office? How long does the trip take? What time will he arrive home? Where are Mr. and Mrs. Ober going tonight?

B. Answer the following questions by using adverbs or prepositional phrases. Your sentences should form a paragraph.

How long do you sleep every night?

I sleep eight hours every night.

My Routine

When do you get up in the morning? What time do you eat in the morning? When do you study or go to work? How long do you work? When do you stop for lunch? How long does lunch eat? When do you return to work in the afternoon? Until when do you work? When do you leave for home? How do you go home? How long does the trip take?

Paragraph Development

Read and study the following paragraphs. They have been developed according to time sequence. The paragraphs contain many examples of the sentences patterns noun + verb and noun + verb + adverb/prepositional phrase.

Alice

Alice was born in a small town in California. She lived there until the age of seventeen. Then her mother and father moved to a larger city. She studied at a junior college there for two years. Then she went tom a large university. The university was far from her home. She could not drive there each day. Therefore, she moved near the university and lived with some friends. She studied hard and spent a lot of time in the library. She graduated from the university with honors two years later. Then she became a teacher. She taught in an elementary school near her parents` home. At the elementary school, she met a young man. He also was a teacher. They became friends. They will married in the summer during the school vacation.

3. Reading

Industrial Safety

Industrial safety is absolutely needed in every industrial firm or factory. Do you know why? Because there are always many possible dangers in these workspaces. All the workers must wear special equipment and clothing when they are at work.

Look the following notice. Every worker must always remember these points.

SAFETY RULES (Eight Points to Remember)

1. Always wear an apron on overall.
2. Wear a shirt short sleeves or roll up the long sleeves.
3. Always wear safety boots at work.
4. Be sure that your hair is always short.
5. Wear goggles and gloves during work on machine.
6. Don't carry sharp tools I the pockets.
7. Don't run in the workshop. Always work.
8. Don't hang object around the neck.

Protect yourself ! Don't become the victim of a serious accident.

WORDS TO REMEMBER

| | |
|------------|----------------|
| Safety | = keselamatan |
| Absolutely | = mutlak |
| Firm | = perusahaan |
| Factory | = pabrik |
| Possible | = mungkin |
| Danger | = bahaya |
| Special | = khusus |
| Equipment | = perlengkapan |
| Clothing | = pakaian |
| Apron | = baju kerja |
| Overall | = baju praktik |
| Sleeves | = lengan baju |
| Roll up | = menggulung |

| | |
|----------|----------------------|
| Wear | = memakai |
| Boots | = sepatu |
| Goggles | = kaca mata Pengaman |
| Gloves | = sarung tangan |
| Hang | = menggantungkan |
| Protect | = melindungi |
| Accident | = kecelakaan |

4. Evaluation

Exercise 1. Answer these questions in brief!

1. What is absolutely needed in every industrial firm?
2. Why is it absolutely needed in every workplaces?
3. How many points are there in this notice?
4. When must the workers wear goggles and gloves?
5. What happen if you do not follow the safety rules?
6. How should you protect yourself at work?

Exercise 2.

1. The doctor`s.....was that I had bronchitis. (diagnose)
2. The.....of the blood will help the police find the murderer.
(analyse)
1. In England there is no postal.....on Sundays. (deliver)
2. He still suffers from anhe received in a game of football ten years ago. (injure)
3. Police dogs are trained to a high standard of.....(offend)
4. There was a very loud.....when the bomb went off. (explode)
5. He was delighted by his.....in the national football team.
(include)

Exercise 3: Example: (Don / have / a bath).....Don was having a bath

1. (Ann / write / a letter in her room)
2. (George / get / ready to go out)
3. (Carol and Dennis / have / dinner)
4. (Tom / make / a phone call)

Exercise 5

Example: Dr. John teaches. (where) (when)

Dr. John teaches at a technical institute in the evening.

1. Dr. Joko lectured. (where) (when)
2. She talked. (how long)
3. She spoke (how)
4. The students listened. (how)
5. They neither read nor slept (when)
6. They asked questions and took notes. (when)
7. The professor answered. (how) and (how)
8. The students understood. (when)]
9. They applauded. (how) (when)
10. A difficult lecture ended. (how)

Exercise 7: Write a short paragraph about your own life or about the life of someone you know. Use the paragraph entitled *Alice* as a model. Events in the paragraph should be presented in time sequence. Begin your paragraph with these sentences: *I was born in (place) in (year). I lived there.....*

UNIT VI

COMPARISON AND CONTRAST

1. Comparison and Contrast

Comparing means putting two or more objects, facts or ideas together and stating in what ways they are similar or dissimilar. The two phenomena must be comparable, that is, they must have some characteristics in common.

Comparing two things is a fairly simple logical operation. Nevertheless, there is a wide variety of phrases and sentence structures that can be used to express different kinds of comparison.

In what different ways can things be compared?

□ Similarity

When you want to emphasise the similarity between two things, you can use the following sentence patterns:

| | | | |
|---------------|---------------------------|--|------------------------------|
| A | is are should be | (about / almost / roughly / essentially the same as) | B |
| | | similar to | |
| | | like | |
| | | equal to | |
| | | No different from | |
| | can be | compared directly to | in every respect |
| A and B | are | identical | in most respects in that ... |
| | | The same | |
| | | alike | |
| | | similar | |

Some example sentences

- The characteristic feature of the totality of natural numbers, ..., *is logically equivalent to* the principle of mathematical induction.
- A point set in S in the plane is called bounded if For a point set in space the definition *is similar*, we
- *By way of analogy*, the ALU may be thought of as a super adding-machine.
- We define an accumulation point of S *in exactly the same way* as we did for point set on the line.
- Sweden, *like* Finland, has very large resources of timber.

The following linking words and phrases may also be used to express similarity:

like ...; as well as ...; both ... and ...; just as ...; In the same way, ...
Similarly, ...

□ **Dissimilarity**

Dissimilarity basically means that one phenomenon is either *more* or *less* than another in one or several respects. The following structures can be used:

| | | | | | |
|---|--------|--|---|------|---|
| A | is | (much) (far) (substantially) (somewhat) (rather) (slightly) | adjective + -er more + adjective less + adjective | than | B |
| | | (almost) | as + adjective | as | |
| | is not | (quite) | so + adjective | | |

Example sentence:

So even though it's non-porous, *much thicker* and *far more reliable than* gold plating, we can almost always offer our glad connectors for *less than* you would pay for an ordinary connector. In general, the dependence of the open-loop gain on temperature is *of less importance than* the thermal behaviour of the amplifier frequency response.

□ **Superiority and inferiority**

This means saying how something is better or worse than something else, with regard to particular features. Phrases you can use include:

| | | | | | | |
|---|----|-------------------------|---|---|---------------------------|--|
| A | is | superior to inferior to | B | in a certain way from a certain point of view with regard to ... as regards ... | | |
| | | | | in being in that it is inasmuch as it is | | more + adjective less + adjective |
| | | | | in | giving showing exhibiting | more + noun greater + noun less + noun |

Example sentences:

- The reciprocating pump is superior to the rotary pump in being more efficient.
- The yarn strength of air-vortex spun yarns is somewhat inferior to that of rotor-spun yarns, a 5% difference in strength being reported.

□ **Proportionality and disproportionality**

When two objects, X and Y, are considered in relation to each other, the variability of certain of their features or characteristics can be compared. The comparison may produce either a proportional or a disproportional result. You can use the following sentence structures:

| | | | | | |
|----------------|----------------|-------------|---|--------------------------------|----------------|
| A feature of X | changes varies | (inversely) | with as according to in accordance with | (a change in) (a variation in) | a feature of Y |
| | is | | proportional to | | |

| | | | | | |
|------------|----------------|------------------|--------------|----------------|--------|
| as | a feature of X | changes, varies, | so does | a feature of Y | |
| | | | so | | |
| the better | | | the (better) | | + verb |

Example sentences:

- *The higher* the velocity of steam, *the greater* the turbine speed.
- Data input rise and fall times *reduce as* driver output impedance increases.
- The critical twist value, after which strength decreases, is lower for the former, but *increases with increasing* yarn linear density, which is the reverse of the effect found for conventional yarns.
- During expansion, the pressure *varies inversely to* the volume.

□ **Contrasting**

Contrasting is a specific kind of comparison. Whereas in comparing you normally look for at least one feature that the two or more objects have in common, in contrasting you aim to identify the differences between them.

Here are some useful sentence structures:

| | | | |
|-------|------------------------------|---|-----------------|
| It is | common useful valuable | to distinguish to differentiate to make a distinction | Between A and B |
|-------|------------------------------|---|-----------------|

| | | | |
|---|-----------------------------------|---|--|
| A | differs from is different from | B | in a certain respect in the fact that ... in that it is... |
| | can be distinguished from | | by its ... (a certain characteristic) |
| Unlike In contrast to As opposed to As distinct from As against | B | A | is + adjective has + noun |

Some common conjunctions and sentence linkers for expressing contrast:

While ..., ... Whereas ..., ... On the other hand, ...

Example sentences:

- The RAM differs from the ROM in that it can be written into as well as read from.
- It is useful to differentiate between a blower and a liquid.
- The engine, as distinct from the earlier one, has six cylinders.
- Unlike discrete-component designs, however, the microprocessor is not programmed using ...
- These differences are ascribed to the fact ... most fibres have both ends spun in, whereas in the case of ring-spun yarns one fibre end frequently protrudes from the yarn.
- A hot engine will run on a weak mixture. On the other hand, a cold engine requires a richer mixture.

2. Guided Writing

Example: Arrange the following cues in proper word order to make complete sentences. Write the sentences in paragraph form. Begin your paragraph with this sentence: *The science of aviation has developed greatly over the years.*

1. Leonardo da vinci – experimental models – made – of flying machines – in the fifteenth century
2. made – a Frenchman, de Rogier – in 1783 – the first ballon flight
3. an Englishman, Henson – of a steam powered aircraft – made a model – in 1842
4. in 1853 – Henri Gifford – the first steam powered, lighter than aircraft – flew
5. Otto Lilienthal – the first glider – made – 1891 – in Germany
6. by the North Americans, Orville and Wilbur Wright – the first engine powered, heavier than air planes – in the early twentieth century – were made and flown – and the Brazilian, Alberto Santos Dumont

The science of aviation has developed greatly over the years. Leonardo da Vinci made experimental models of flying machines in the fifteenth century. A Frenchman, de Rogier made the first balloon flight in 1783. An Englishman, Henson made a model of a steam powered aircraft in 1842. Henri Gifford flew the first steam powered, lighter than aircraft in 1853. Otto Lilienthal made the first glider in Germany in 1891. In the early twentieth century the first engine powered, heavier than air planes were made and flown by the North Americans, Orville and Wilbur Wright and the Brazilian, Alberto Santos Dumont.

3. Paragraph Development

Read and study the following paragraphs which are developed according to time sequence:

Aunt Frances

Let me tell you about my Aunt Frances. She had an interesting life. She became a secretary after she finished high school. She didn't like that work, so she entered a university. At first, she wanted to be a teacher. Then she decided to be a nurse. Then she thought about being an engineer. Finally, she decided to be a doctor. She married after she received Her M.D. degree, and she soon had five children. However, she continued to work. After some years of experience, she became a medical researcher. She devoted her career to cancer research.

4. Reading

FUTURISTIC MILITARY COMBAT ROBOTS

The latest war robot technology - The war of the present day is predicted for the future, not the same as the World War II era or the Cold War era. The war in the future will favor a war robot that can be controlled from a distance. For now, the country that is being intensively incessantly preparing its military robot is the United States, Russia and China.

On September 8, 2016, Russia showed off their latest war robot technology featuring dynamic performances involving mine clearance operations and demonstrating speed and maneuverability in modern warfare. The robots featured will include the Nerechta robot system, the Avtorobot, the crew-carrying robot, and Shershen, which is an unmanned aircraft. The Newest Robot War Technology Ready to Face The Modern War Age In The Future In addition, the United States has also begun research to create a war robot that will help its military defense. They want a robot that can be controlled from a distance and does not require human labor to perform some military tasks. It is prepared to face the year 2019 that reportedly the United States will lower its military forces to 420,000 from 540,000 people today

The first Robot Bagal, which is a robot that resembles a horse and four-legged. They named it AlphaDog. The use of this robot is to carry heavy items and can cross even uneven terrain by staying stable. Second is iRobot's 710 Cobra, is a bomb-disposal robot that will help US military forces. As we know, the act of throwing bombs is very dangerous and risky if done by humans. So iRobot was created to perform this action with the remote control. And the last is Robot Guard, is a robot that will replace the role of human soldiers in maintaining certain areas. This robot able to watch for 24 hours and able to detect the arrival of the opponent. This robot is also equipped with weapons that can launch a shot as far as 3 miles.

On the other side China has also invested heavily to deliver robots equipped with Artificial Intelligence as its military robot. China's latest war technology robot is in the stage of perfection that each unit is equipped with antitank bullet weapons, grenades and assault rifles that make this Chinese military robot into the ideal robot for the battle

Reference by
Pahompu.com

5. Evaluation

Exercise 1: Student A covers the information on the right. Student B has the price list. A asks about things below. Use this model:

A : How much is this Parker pen?

Does this Parker pen cost?

B : Oh, It`s.....

That one`s.....

A : And what about this.....?

Price list

Gold ring \$ 125.00

Parker pen \$ 40.25

Silver ring \$ 75.50

Cross pen \$ 25.76

Seiko watch 140.78

small handbag \$ 33.50

Citizen \$ 80.50

large handbag \$ 45.60

Exercise 2

Example: I`m thinking of going to live in Canada.

Tom said that he was thinking of going to live in Canada.

1. Nora and Jim are getting married next month.
2. I don`t see Bill for a while.
3. I will tell Jim I saw you.
4. You can come and stay with me if you are ever in London.
5. Tom had an accident last week but he wasn`t injured.

Exercise 3: Arrange the following cues in proper word order to make complete sentences. Write the sentences in paragraph form. Begin your paragraph with this sentences: *The Olympic Games were first held in ancient Greece.*

1. abolished – the emperor Theodosius – in 394 A.D – the Olympic Games
2. about 1,500 years later – again – started – the Olympic Games
3. were held – the first modern Olympic Games – in 1878
4. for the first time – women – in modern Olympic Games – competed – in 1900
5. began – the Winter Olympic Games – in 1924.

Exercise 4: Write paragraph about the life of a real or imaginary relative or friend. Use the paragraph entitled *Aunt Frances* as a model. Events in the paragraph should be presented in time sequence. Begin your paragraph with these sentences: *Let me tell you about my.....He / She has had an interesting life.*

Exercise 5 : Complete the sentences using a suitable phrasal verb from the box.

| | | |
|------------|----------|---------|
| Break down | clear up | get on |
| Speak up | show off | grow up |
| Turn up | fall off | move in |
| Close down | | |

1. Be careful on that horse! Don't.....
2. Sorry I'm late. The car..... on the way here.
3. How did you.....in your interview yesterday?
4. There used to be a very good shop on the corner but it.....a year ago.
5. 'We have bought a new house'. 'Oh, have you? When are you.....?'
6. Wayne is eight years old. When he....., he wants to be a pilot.
7. I arranged to meet Jim after work last night but he didn't.....
8. The weather's horrible, isn't it? I hope it.....later.
9. We all know how wonderful you are. There's no need to.....
10. (on the telephone) I can't hear you very well. Can you.....a bit

Exercise 6: Answer these questions!

1. What do you know about robot?
2. Do you think that robots are important for future? Why?
3. Do you want a robot in your house? Give the reason.
4. What do you think about combat military robots?
5. Do you agree if robot is using in the war? Why?

UNIT VII

SCIENCE WRITING 2

1. Defining, Emphasizing, Generalizing, and Paraphrasing Words or Sentences

A. Defining

In science and technology, there are generally two kinds of definitions:

- 1) the real definition, that is a definition that explains precisely the essential, intrinsic characteristics of an object.
- 2) the nominal definition, that is one that helps to determine the meaning of a term, such as a word, sentence, or symbol, e.g. in a mathematical language.

B. Emphasizing

In your writing you will be making statements that vary in importance. You will therefore need to make sure that the most important ones are given more emphasis than the less important ones. Details in your argument have to be presented in such a way that readers understand their relative significance.

How can I emphasize points visually?

- make use of tables, graphs, charts and other visual forms of illustration in support of your written text. It is easier for many readers to extract information from a diagram than to follow the detail of your written argument. However, you should realize that the more tables you include, the less will be the impact of each.
- visually, text that has white space around it stands out more than something that is surrounded by a lot of other text. Therefore

- make use of headings, separated from the body of writing
- occasionally break up your paragraph into bullet points. (Though this should not be overused, except perhaps in a report where it is more acceptable)

Gallium arsenide is a remarkable material with a battery of useful qualities:

- It moves electrons around three to six times faster than silicon.
- It emits light - something silicon cannot do.
- It absorbs sunlight more efficiently than silicon, making possible better solar cells
- It uses less power than silicon.
 - make sure you put the main idea at the start or at the end of your paragraph so that its importance is not concealed by other sentences around it
 - vary the length of your sentences, and of your paragraphs. In particular, sentences or paragraphs that are shorter than the norm do stand out.

C. Generalizing

Your writing will proUNITly consist of a mixture of both general statements and specific statements and it is important to distinguish between the two. Generalising means making an overall statement, for example in the form of a conclusion, on the basis of supporting statements that provide the details or the evidence.

Are there any generalisations I should avoid?

Yes. For example:

- the 'sweeping' over-generalisation, in which you say something is true in every situation. Your statement may have some element of truth but cannot be treated as valid because there are so many exceptions and it is unsupported by evidence.

Boys are better at science at school than girls.

- expressing your own viewpoint as if it were a generally accepted truth

X is obviously the most highly regarded physicist of his generation.

- making non-statements that are either so obvious that they need not be stated or so vague that they have no real meaning.

After recognising problems with the solar mirrors, we carried out some corrective procedures.

If this sentence stands alone without supporting information, it is far too general. It raises more questions than it answers: What were the problems with the mirrors? How many mirrors were involved? What precisely were the corrective procedures taken?

What language can I use when making general statements?

The main principle is to tone down your statements, make them less absolute. For more ideas about this, see hedging.

- verbs and verb phrases

- tend (not) to ..., have a tendency to ...
- be inclined to ...
- seem to ..., appear to ...
- It appears / seems to / that ...
- It would seem / appear to / that ...

- adverbs of frequency: avoid absolutes like always / never

- usually, normally, generally
- regularly, often, frequently
- sometimes, occasionally, at times, now and again
- rarely, seldom, hardly ever

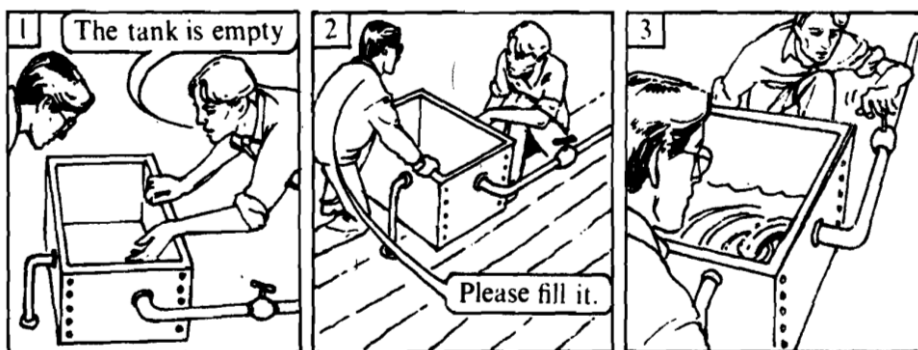
- modifying adverbs

* mainly, primarily, principally, chiefly, above all, overall

- * in general, on the whole, as a rule, largely
- * for the most part, mostly
- * especially, particularly, notably
- * clearly, obviously, evidently, distinctly, plainly, noticeably
- * significantly
- * relatively, comparatively
- * somewhat, rather, fairly, quite
- * slightly

2. Dialogue

ASKING, WARNING AND COMMAND



Match these sentences in the same way:

Example: Ron : The tank is empty

Alan : Please fill it

- | | |
|----------------------------|--------------------------|
| a. The tank is empty | (1) Please loosen it. |
| b. The door is open. | (2) Please open them |
| c. The belt is tight | (3) Please empty it |
| d. The window are closed | (4) Please pick it up |
| e. The screws are loose | (5) Please fill it. |
| f. The bin is full. | (6) Please open it. |
| g. The bottles are empty | (7) Please tighten them. |
| h. The light is on | (8) Please switch it off |
| i. The saw is on the floor | (9) Please close it |
| j. The box is closed | (10) Please fill them. |

What is Ron Saying?

- Example:* 1 Please give me the nails, Alan.
2 Could you bring me the ruler, please, Kamal?



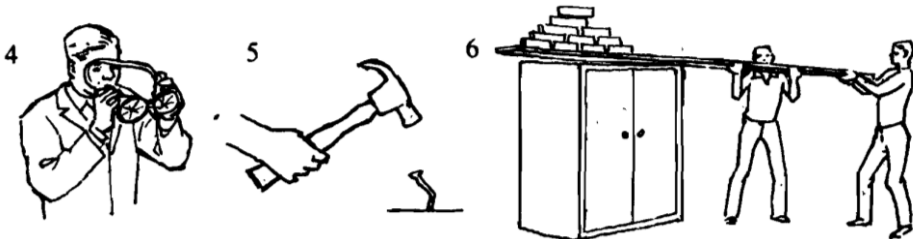
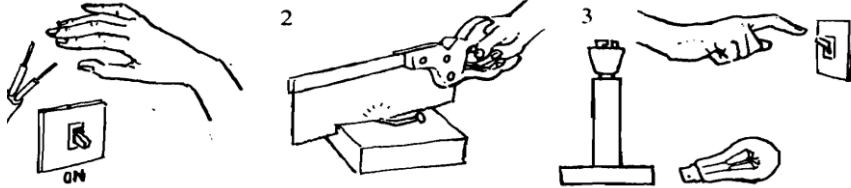
'Don't touch it!'



Repeat : Don't touch it! It's live

Match the pictures, the warning and the reasons

Example: Picture 1 – (4) – (f): Don't touch the wire. It's live.



WARNING

- (1) Don't switch the lamp on.
- (2) Don't saw that wood.
- (3) Don't hammer that nail.
- (4) Don't touch the wire.
- (5) Don't pull these goggles on.
- (6) Don't pull that board.

REASON

- (a) They're broken.
- (b) There's a nail in it.
- (c) There are bricks on it.
- (d) There's no bulb in it.
- (e) It's bent.
- (f) It's live.

Match the Command or Instructions with the numbers in the picture

Example: (a) Don't smoke here – picture 5

- (a) Don't smoke here.
- (b) Put that down.
- (c) Put these on.
- (d) Pick these up.
- (e) Switch it on.
- (f) Take that off.
- (g) Push that in.
- (h) Pull that down.



NOTE:



put the
helmet on



take the
helmet off

3. Evaluation

Exercise 1: Ex: I am too tired to walk home I think I will get a taxi.

1. I feel a bit hungry. I think.....something to eat.
2. It is too late to telephone Tom now.him in the morning.
3. It is a bit cold in this room. Is it?..... on the heating then.
4. We have not got any cigarettes. Oh, haven't we?and get some.
5. Did you write that letter to Jack? Oh, I forgot. Thanks for reminding me.
.....it this evening.

Exercise 2: Put the adjectives in brackets in the correct position.

Example: a beautiful table (wooden round)

= a beautiful round wooden table

1. An unusual ring (gold).....
2. An old lady (nice).....
3. A sunny day (lovely).....
4. A hot bath (nice).....
5. An ugly dress (orange).....

Exercise 3: In this exercise you have to complete the sentences with these verbs: Example: Do you fancy playing tennis?

| |
|--|
| Try steal meet look write make be knocked Wash play eat splash go drivetake |
|--|

1. Could you please stop.....so much noise?
2. I don't enjoy.....letters.
3. Does your job involve.....a lot of people?
4. I consideredthe job but in the end I decided against it.
5. If you use the shower, try and avoidwater on the floor.

Exercise 4: In this exercise you have to complete each sentence with a suitable verb.

Examples: Don't forget to post the letter I gave you.

1. Tom refused.....me any mooney.
2. Jill has decided not.....a car.
3. The thief got into the house because I forgot.....the window.
4. There was a lot of traffic but we managed...to the airport in time
5. I've arranged.....tennis tomorrow afternoon.

Exercise 5

Example: Jill didn't have any money

She / want / Ann / lend her some

Answer: She wanted Ann to lend her some

1. Tom's parents were sad when he decided to leave home.
They / want / Tom / stay with them
2. Please don't tell anyone that I'm leaving my job.
I / not / want / anyone / know
3. There's a football match next Saturday between England and Scotland.
You / want / Scotland / win?
4. Unfortunately someone had told Sue that I was going to visit her.
I / want / it / be a surprise

UNIT VIII

SCIENCE WRITING 3

1. Paraphrasing

Paraphrasing means expressing the thought, meaning and attitude of another author in your own words, in a clear and straightforward way. It is therefore like quoting, but it is done indirectly, without using the original writer's actual words or speech marks. With paraphrasing, you avoid continuous strings of direct quotations and can maintain your own style and tone of writing. However, as with direct quoting, it is essential that you do proper referencing for all your paraphrases.

With a paraphrase, your aim is to relate what the author has said to your own piece of work, and this often requires you to provide an interpretation, or gloss, on their ideas in some way, to make them fit into your argument. A paraphrase is not just a simple re-wording of the original.

How long should a paraphrase be?

- There is no set length, as it depends on how much of a writer's work you want to refer to, and in how much detail. In some cases, paraphrasing may simply involve reducing, or summarising, what the original writer has said into a single sentence:

The first published professional response to ape language studies was an article by Jacob Bronowski and Ursula Bellugi (1970). They argued that although chimpanzees might be able to use reference, they could not break grammatical units down to their units and recombine them (a process they called 'reconstitution').

- It may give a more detailed description of a writer's argument, consisting of a paragraph or more:

Levins (1968) used fitness sets to identify the optimal genetic strategy in response to environmental variation. The optimal genetic strategy is not determined solely by the nature of the environmental heterogeneity but partly by the perception of that heterogeneity. For example, it is very unlikely that The general conclusion of these analyses of fitness sets was that fine-grained species would evolve a strategy of monomorphism, whereas coarse-grained species would maintain polymorphism.

Language to use to introduce paraphrases

- You can use the same 'reporting' verbs for paraphrasing as are given in Section 4.8 on Quoting. In particular, verbs that reflect the original writer's purpose or attitude towards his/her subject are useful when paraphrasing, e.g.

X identifies ... as ...

X defends his position by arguing that

X attacks his opponents with his statement that ...

X affirms his opinion that ...

- Note that the 'reporting' verb can be followed by that ... (or this can be omitted). Punctuation: there is no comma before or after that:

Fred Hein explains that each person's heredity is unique, except for identical twins.

- The normal grammatical rules for writing indirect speech apply:

When the reporting verb is in the past tense, the verb tense in the reported clause, together with pronouns and time phrases may also have to be changed to indicate the correct time references.

MacSpratt (6) found that when sheep were deficient in nitrogen, the rate of mitosis in wool follicles was 63% of normal and concluded that nitrogen is essential to normal growth of wool.

Note that the last verb is *is* in the present tense: this is because the writer is generalising, or making a conclusion about what he regards as a general truth. If the writer knows that later work found this conclusion to be false, he would use *was* instead.

- You can also use the other introductory phrases given in the section on quoting. These in fact are more commonly used with indirect quotations than with direct ones.
- With indirect quotations, you can also simply put the name of the source at the end of the paraphrase, without any 'reporting' verb or introductory phrase:

Changes in the surface heating of the earth will result in changes in the heating of the atmosphere which in turn can affect the climate (Cohen, 1994).

Quoting

When writing a research paper or report, it is normal to include references and quotations from the work of others. This is for one or more of the following reasons:

- to cite evidence or opinions from an authority on the subject in support of your argument
- to put forward someone else's viewpoint that you intend to argue against
- to show the range of source materials you have used to support or challenge your own ideas
- to acknowledge that your arguments derive from the work of others and thereby put them into their academic context

What kinds of quotation are there?

Quotations in your text can either be

- direct: that is, you use the actual words of the original writer, or
- indirect: that is, you paraphrase what the original source says by putting the ideas in your own words.

In general, it is preferable to use the indirect, or paraphrasing, method since this incorporates the other author's ideas better into the flow of your own text. However, there are occasions when direct quotations are better:

- when the author expresses an idea in a particularly succinct or memorable way that it is impossible to improve on it
- when the writer is such an important authority on the subject that his/her actual words are significant
- when you want to avoid any ambiguity about the quoted ideas

Language to use to introduce quotations

- There are a wide variety of 'reporting' verbs and verb phrases that you can use to introduce a quotation. Here are some of the more common ones

acknowledge ... admit ... allege ... argue ...
assert ... assume ... believe ... claim ...
conclude ... contend ... demonstrate ... describe ...
emphasise explain ... imply ... indicate ...
make the point ... observe ... point out ... postulate ...
predict ... propose ... prove ... report ...
say ... show ... state ... suggest ...
think ... write

Be careful about the verb tenses of these verbs:

- If you use MLA Style, you should put the verbs in the present tense both for personal comments and for quotations.

- If you use APA style (more common for the natural sciences), you should put the verbs in the past tense for citations, and only use the present tense for generalisations and statements about unchanging facts. (See the example quotations above).

You can introduce your citation with any of these longer phrases:

According to X, ...

As X has shown, ...

For X, ...

In X's view, ...

By this, X meant ...

X was of the opinion that ...

X distinguished between ... and ...

X characterised / considered / defined / recognised / referred to / regarded ... as ...

X illustrated his / her argument by saying / stating / showing that ...

X laid particular emphasis on ...

X makes the following claim / point / statement: ...

X put forward the theory that ...

Referring to ..., X said / stated / showed ...

2. Reading

How Geothermal Energy Works

Geothermal electricity are power plants that use geothermal energy as an energy source. To generate electricity with geothermal done by drilling the ground in areas that have geothermal potential, to make holes of hot gas that will be used to heat the boilers (boilers) so that the steam can drive the steam turbine connected to a generator. For geothermal that has high pressure, can directly rotate the turbine generator, after the steam that came out cleaned first. Geothermal power plants, however, use steam produced from reservoirs of hot water found a couple of miles or more below the Earth's surface. There are three types of geothermal power plants: dry steam, flash steam, and binary cycle.

The steam rotates a turbine that activates a generator, which produces electricity. Many power plants still use fossil fuels to boil water for steam. Geothermal power plants, however, use steam produced from reservoirs of hot water found a couple of miles or more below the Earth's surface.

Water or working fluid is heated (or used directly in case of geothermal dry steam power plants), and then sent through a steam turbine where the thermal energy (heat) is converted to electricity with a generator through a phenomenon called electromagnetic induction.

- Indonesia – 1,197 MW.
- Mexico – 958 MW.
- Italy – 843 MW.
- New Zealand – 628 MW.
- Iceland – 575 MW.
- Japan – 536 MW.
- El Salvador – 204 MW.
- Kenya – 167 MW.

Currently, two types of geothermal resources can be used in binary cycle power plants to generate electricity: enhanced geothermal systems (EGS) and low-temperature or co-produced resources.

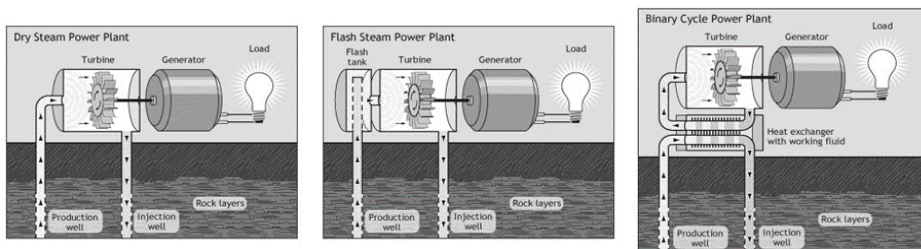
How Geothermal Energy Works

Heat from the earth can be used as an energy source in many ways, from large and complex power stations to small and relatively simple pumping systems. Many regions of the world are already tapping geothermal energy as an affordable and sustainable solution to reducing dependence on fossil fuels, and the **global warming and public health risks** that result from their use. For example, as of 2013 more than 11,700 megawatts (MW) of large, utility-scale geothermal capacity was in operation globally, with another 11,700 MW in planned capacity additions on the way. These geothermal facilities produced approximately 68 billion kilowatt-hours of electricity, enough to meet the annual needs of

more than 6 million typical U.S. households. Geothermal plants account for more than 25 percent of the electricity produced in both Iceland and El Salvador.

Geothermal power stations are similar to other steam turbine thermal power stations – heat from a fuel source (in geothermal's case, the earth's core) is used to heat water or another working fluid. The working fluid is then used to turn a turbine of a generator, thereby producing electricity.

We can also use geothermal energy to make electricity. A geothermal power plant works by tapping into steam or hot water reservoirs underground; the heat is used to drive an electrical generator. Most geothermal plants are located in the western United States, where hot water reservoirs are common.



The three basic designs for geothermal power plants: dry steam, flash steam, and binary cycle. Image: U.S. Department of Energy

3. Evaluation

Exercise 1: Answer the following questions briefly.

1. How energy is produced from geothermal?
2. How the work of geothermal energy?
3. What is the geothermal energy?
4. How does a geothermal power plant work?
5. What countries that use geothermal energy?

Exercise 2. Directions: On a separate piece of paper, write a paraphrase of each of the following passages. Try not to look back at the original passage.

1. "The Antarctic is the vast source of cold on our planet, just as the sun is the source of our heat, and it exerts tremendous control on our climate," [Jacques] Cousteau told the camera. "The cold ocean water around Antarctica flows north to mix with warmer water from the tropics, and its upwellings help to cool both the surface water and our atmosphere. Yet the fragility of this regulating system is now threatened by human activity." From "Captain Cousteau," Audubon (May 1990):17.
2. The twenties were the years when drinking was against the law, and the law was a bad joke because everyone knew of a local bar where liquor could be had. They were the years when organized crime ruled the cities, and the police seemed powerless to do anything against it. Classical music was forgotten while jazz spread throughout the land, and men like Bix Beiderbecke, Louis Armstrong, and Count Basie became the heroes of the young. The flapper was born in the twenties, and with her bobbed hair and short skirts, she symbolized, perhaps more than anyone or anything else, America's break with the past. From Kathleen Yancey, English 102 Supplemental Guide (1989): 25.
3. Of the more than 1000 bicycling deaths each year, three-fourths are caused by head injuries. Half of those killed are school-age children. One study concluded that wearing a bike helmet can reduce the risk of head injury by 85 percent. In an accident, a bike helmet absorbs the shock and cushions the head. From "Bike Helmets: Unused Lifesavers," Consumer Reports (May 1990): 348.
4. Matisse is the best painter ever at putting the viewer at the scene. He's the most realistic of all modern artists, if you admit the feel of the breeze as necessary to a landscape and the smell of oranges as essential to a still life. "The Casbah Gate" depicts the well-known gateway UNIT el Aassa, which pierces the southern wall of the city near the sultan's palace. With scrubby coats of ivory, aqua, blue, and rose delicately fenced by the liveliest gray

outline in art history, Matisse gets the essence of a Tangier afternoon, including the subtle presence of the bowab, the sentry who sits and surveys those who pass through the gate. From Peter Plagens, "Bright Lights." Newsweek (26 March 1990): 50.

5. While the Sears Tower is arguably the greatest achievement in skyscraper engineering so far, it's unlikely that architects and engineers have abandoned the quest for the world's tallest building. The question is: Just how high can a building go? Structural engineer William LeMessurier has designed a skyscraper nearly one-half mile high, twice as tall as the Sears Tower. And architect Robert Sobel claims that existing technology could produce a 500-story building. From Ron Bachman, "Reaching for the Sky." Dial (May 1990):15.

UNIT IX

ABBREVIATION, PREFIXES, AND SUFFIXES

1. Abbreviation, Prefixes, and Suffixes

A. Abbreviation

In scientific writing, there are several abbreviations in use which originate from Latin or Greek. In general, it is not a good idea to use too many of these within the body of your writing, but they can be used occasionally when needed, and they are often necessary in your references and bibliography.

Below is a selection of common abbreviations and their English equivalents.

| abbreviation | Latin words in full | meaning |
|--------------|---------------------|----------------------------------|
| AD | anno Domini | since the birth of Christ |
| a.m. | ante meridiem | in the morning |
| BC | before Christ | |
| c. or ca. | circa | approximately, about (for dates) |
| cf. | confer | compare |
| e.g. | exempli gratia | for example, for instance |
| et al. | et alii / et alia | and others |
| etc. | et cetera | and so on, and the rest |
| et seq. | et sequens | and the following pages |
| ibid. | ibidem | in the same place / book |
| i.e. | id est | that is, in other words |
| inter alia | among other things | |
| loc.cit. | loco citato | in the place mentioned |

| | | |
|----------|---------------|---|
| NB | nota bene | note well (for an important point) |
| op. cit. | opere citato | in the work mentioned before |
| p.a. | per annum | a year, each year |
| | per capita | per head |
| p.m. | post meridiem | in the afternoon, evening |
| | passim | at various points in the book, recurrent |
| q.v. | quod vide | see in another place in the same book (for a cross-reference) |
| v. / vs. | versus | against |
| viz. | videlicet | namely (naming something you have just referred to) |

B. Prefixes

A common way of making new words in English is by adding standard combinations of letters to existing words, either at the beginning (prefixes) or at the end (suffixes). By noting these carefully, you will find it easy to increase your vocabulary.

A prefix is a syllable, 2 syllables, or sometimes even a word, put at the beginning of a word to change its meaning or to make another word. Prefixes are often used to give an adjective, a verb or a noun a negative meaning, but there are also lots of other prefixes with specific meanings.

Prefixes with the meaning *not*

The most common prefixes used to give a negative meaning to adjectives, and some verbs and nouns, are as follows:

| prefix | use | positive | negative |
|-------------|---|-------------------------------|--|
| <i>un-</i> | used with many different words | lucky friendly employed | <i>unlucky</i> <i>unfriendly</i> <i>unemployed</i> |
| <i>im-</i> | used before words beginning with <i>m</i> or <i>p</i> | possible mature | <i>impossible</i> <i>immature</i> |
| <i>il-</i> | used before some words beginning with <i>l</i> | literate legible | <i>illiterate</i> <i>illegible</i> |
| <i>ir-</i> | used before some words beginning with <i>r</i> | regular responsible | <i>irregular</i> <i>irresponsible</i> |
| <i>in-</i> | used before a limited number of words | correct visible | <i>incorrect</i> <i>invisible</i> |
| <i>dis-</i> | used before some adjectives and a few verbs | honest like | <i>dishonest</i> <i>dislike</i> |

Unfortunately, there is no easy way of knowing which prefix any adjective will use to form its negative. So when you learn a new adjective, note down whether it has an opposite formed with a prefix and, if so, what it is.

- **The prefix *in-*.** This does not always have a negative meaning – often it gives the idea of inside or into, e.g. *internal*, *insert*, *income*.
- **Verb prefixes: *un-* and *dis-*.** These prefixes have two meanings. They can have a negative meaning (as above), but they can also mean 'the opposite of an action' or 'to reverse an action'. This meaning is used with certain verbs, e.g. *to lock* – *to unlock*, *to pack* – *to unpack*, *to appear* – *to disappear*, *to get dressed* – *to get undressed*.

Other prefixes with specific meanings

Many other prefixes are used in English. Below is a list of prefixes which are useful in helping you to understand unfamiliar words. Some of these words are used with a hyphen. Check in a dictionary if you are not sure.

| Prefix | Meaning or Function | Examples |
|-----------------------------------|----------------------------|---|
| <i>a- (an)</i> | not, not having | <i>atypical, anhydrous</i> (not containing water) |
| <i>aero-</i> | air | <i>aerospace</i> |
| <i>anti-</i> | against | <i>anti-toxin</i> |
| <i>auto-</i> | self, by itself | <i>autointoxication</i> |
| <i>bi-</i> | two | <i>bi-metallic</i> |
| <i>bio-</i> | life | <i>biology</i> (science of life) |
| <i>centi-</i> | 100 or 1/100 | <i>centimeter, Centigrade</i> |
| <i>co-</i> | together, with | <i>co-operation</i> |
| <i>contra-</i> <i>counter-</i> | against, opposite | <i>contra-rotating; counteract</i> |
| <i>de-</i> | taken away from | <i>dehydrated</i> |
| <i>deci-</i> | a tenth | <i>decimeter</i> (tenth of a meter) |
| <i>deka-</i> | ten | <i>dekameter</i> (ten meters) |
| <i>di-</i> | two, twice | <i>dioxide</i> |
| <i>hydro-</i> | (1) water (2) hydrogen | <i>hydrology</i> <i>hydrocarbon</i> |
| <i>hyper-</i> | over, excessive | <i>hypertension</i> |
| <i>hypo-</i> | below, less than usual | <i>hypotension</i> |
| <i>infra-</i> | below, under | <i>infra-red</i> (below the wavelength of red) |
| <i>inter-</i> | between | <i>interconnection</i> |
| <i>intra-</i> | inside | <i>intravenous</i> |
| <i>iso-</i> | equal | <i>isostatic</i> |
| <i>kilo-</i> | a thousand | <i>kilogram (me)</i> (1000 gram (me)s) |
| <i>macro-</i> | large, on a large scale | <i>macromolecule</i> |
| <i>mega</i> <i>(lo)-</i> | very large, a million | <i>megawatt</i> (a million watts) |
| <i>meta-</i> | change | <i>metamorphic</i> |
| <i>micro-</i> | small, on a small scale | <i>microorganism</i> |
| <i>milli-</i> | a thousandth | <i>milligram (me)</i> (1000th of a gm) |
| <i>mis-</i> | badly, mistakenly | <i>miscalculated</i> |

| | | |
|------------------------|--|---|
| <i>mono-</i> | one, single | <i>monochrome</i> (of only one colour) |
| <i>multi-</i> | many | <i>multilateral</i> (with many sides) |
| <i>neo-</i> | new | <i>neoclassical</i> |
| <i>non-</i> | not | <i>non-conductor</i> |
| <i>out-</i> | (1) more than (2) beyond, outside | <i>outwear</i> (wear or last longer than) <i>outlying</i> (beyond the main body) |
| <i>over-</i> | (1) more than, excessive (2) on top of, above | <i>overproduction</i> <i>overlie</i> (to lie on top of) |
| <i>para-</i> | similar to, irregular | <i>paratyphoid</i> (disease similar to typhus but of different origin) |
| <i>pent (a)-</i> | five | <i>pentagon</i> (5 –sided figure) |
| <i>phot (o)-</i> | light | <i>photosynthesis</i> |
| <i>poly-</i> | many | <i>polymorphous</i> |
| <i>pre-</i> | before, previously | <i>prearranged</i> |
| <i>proto-</i> | first, original | <i>prototype</i> |
| <i>quadri-</i> | four | <i>quadrivalent</i> (having a valency of 4) |
| <i>re-</i> | (1) again, back (2) together, mutually | <i>re-combine</i> (to combine again after being separated) <i>react</i> (to act on each other) |
| <i>self-</i> | by itself | <i>self-regulating</i> |
| <i>semi-</i> | half, imperfect | <i>semi-conductor</i> |
| <i>sub-</i> | under, below, less than | <i>sub-atomic</i> |
| <i>super- (supra)-</i> | above, beyond, more than | <i>supersonic</i> |
| <i>syn- (m)-</i> | with, together | <i>synthesis</i> |
| <i>tetra-</i> | four | <i>tetrad</i> (element having valency of 4) |

| | | |
|---------------|--|---|
| <i>therm-</i> | heat | <i>thermodynamics</i> |
| <i>tri-</i> | three | <i>triangle</i> |
| <i>ultra-</i> | beyond, more than usual | <i>ultraviolet</i> |
| <i>under-</i> | (1) less than, insufficient (2) below, lower than | <i>underpressure</i> <i>undersea</i> |
| <i>uni-</i> | one | <i>unicellular</i> |

C. Suffixes

A suffix is a syllable or syllables put at the end of a word to change its word-class and / or its meaning. Suffixes can briefly be divided into

| | |
|--------------------|---------------------|
| noun suffixes | <i>complication</i> |
| adjective suffixes | <i>flexible</i> |
| verb suffixes | <i>minimise</i> |

Noun suffixes

- Verb + suffix. Many nouns are formed by adding a suffix to a verb. The most common suffixes of this type are as follows:

| Verb | Suffix | Noun |
|---------------|----------------|-----------------|
| enlarge | <i>-ment</i> | enlargement |
| elect | <i>-(t)ion</i> | election |
| inform | <i>-ation</i> | information |
| write | <i>-ing</i> | writing |
| dance, manage | <i>-er</i> | dancer, manager |
| direct | <i>-or</i> | director |

- Note: sometimes there is a spelling change. The most common is the omission of the final *e* before the suffix *-ion* or *-ation*: *translate* / *translation*.
- **Noun + suffix.** *-ist* is a common suffix added to existing nouns to describe people and their jobs : *ecologist*, *journalist*, *artist*.

- **Adjective + suffix.** Nouns are also formed by adding a suffix to an adjective. Two suffixes often added to adjectives to form nouns are *-ness* and *-ity*.

| adjective | suffix | noun |
|-----------|--------------|-----------|
| rich | <i>-ness</i> | richness |
| stupid | <i>-ity</i> | stupidity |

Adjective suffixes

- **Noun or verb + suffix.** Adjectives can be formed from nouns or verbs by adding these suffixes:

| noun or verb | suffix | adjective |
|--------------|-------------|------------|
| fame | <i>-ous</i> | famous |
| industry | <i>-al</i> | industrial |
| sun | <i>-y</i> | sunny |
| create | <i>-ive</i> | creative |

- Suffixes can change word class, e.g. from verb to noun, or noun to adjective, but they can also change meaning. The suffixes *-able* and *-ible* quite often have the meaning of *can be done*, e.g. something that is *comprehensible* can be comprehended.
- Words ending in *-ible* often add the prefix *in-* for their negative forms: *incomprehensible*
- The suffix *-ful* often means 'full of': *colourful* = full of colours.
- The suffix *-less* means 'without': *odourless* = without odour

Here is a list of common suffixes in alphabetical order, their meaning or function and some examples

| Suffix | Meaning or Function | Example |
|--------------|--|--|
| <i>-able</i> | (1) forms adjective from verb (2) with verb means "can be done" | <i>reliable</i> <i>drinkable, countable</i> |
| <i>-age</i> | (1) forms noun from verb | <i>storage</i> |

| | | |
|-----------------------------------|--|--|
| | (2) forms abstract noun with idea of aggregat | <i>tonnage</i> (total number of tons) |
| - <i>al</i> | (1) forms adjective from noun (2) forms noun of action from verb | <i>physical, legal trial</i> (action of trying or testing), <i>arrival</i> |
| - <i>an</i> (see – <i>ian</i>) | | |
| - <i>ant</i> (- <i>ent</i>) | forms noun and adjective from verb | <i>resistant, determinant</i> |
| - <i>ate</i> | (1) in the shape of, like (2) possessing | <i>dentate</i> (in the shape of a tooth) <i>nucleate</i> (having a nucleus) |
| - <i>ation</i> | forms noun from verb | <i>information, organisation</i> |
| - <i>cy</i> | forms noun from adjective | <i>accuracy</i> |
| - <i>ent</i> (see - <i>ant</i>) | | |
| - <i>er</i> | forms noun from verb (1) person who does an activity (2) used for things which do a particular job | <i>computer writer</i> <i>bottle-opener</i> |
| - <i>ful</i> | forms adjective from verb | <i>forgetful, hopeful</i> |
| - <i>hood</i> | forms abstract nouns especially family terms | <i>childhood, motherhood</i> |
| - <i>ian</i> | (1) forms personal noun from sciences (2) forms personal noun from countries | <i>mathematician</i> <i>Australian</i> |
| - <i>ible</i> | e – able | |
| - <i>ify</i> | forms verb from noun or adjective | <i>intensify</i> |
| - <i>ine</i> | forms adjective from noun | <i>saline</i> (having the property of salt) |
| - <i>ing</i> | forms noun from verb | <i>jogging, spelling</i> |
| - <i>ion</i> (see – <i>tion</i>) | | |
| - <i>ise</i> (GB) / | forms verb from adjective | <i>modernise, synthesize</i> |

| | | |
|------------------------------------|---|---|
| <i>ize</i> (US) | | |
| - <i>ish</i> | a bit, resembling | <i>yellowish</i> (a bit yellow) |
| - <i>ism</i> | activity or ideology | <i>journalism, Buddhism,</i> |
| - <i>ist</i> | forms personal noun from sciences | <i>geologist</i> |
| - <i>ity</i> | forms abstract noun from adjective | <i>uniformity</i> |
| - <i>ive</i> | forms adjective from verb | <i>selective</i> |
| - <i>less</i> | forms adjective from noun | <i>colourless</i> (without colour) |
| - <i>logy</i> | study, science | <i>biology</i> (life science) |
| - <i>ly</i> | forms adverb from adjective | <i>quickly</i> (in a quick manner) |
| - <i>ment</i> | forms noun from verb | <i>excitement, replacement</i> |
| - <i>meter</i> | instrument which measures | <i>manometer</i> |
| - <i>ness</i> | forms abstract noun from adjective | <i>completeness</i> (quality of being complete) |
| - <i>oid</i> | like, tending towards | <i>anthropoid</i> (like a man) |
| - <i>or</i> | see -er | |
| - <i>ous</i> | forms adjectives | <i>delicious</i> |
| - <i>scope</i> | instrument for seeing | <i>telescope</i> |
| - <i>sion</i> (see - <i>tion</i>) | | |
| - <i>ship</i> | forms abstract nouns, especially status | <i>friendship, membership</i> |
| - <i>sis</i> | process, state (in medicine a diseased state) | <i>symbiosis</i> |
| - <i>tion</i> (- <i>sion</i>) | forms noun from verb | <i>combination</i> |
| - <i>ty</i> (see - <i>ity</i>) | | |
| - <i>y</i> | forms adjective from noun or verb | <i>cloudy, foggy</i> |

2. Evaluation

For each sentence below, study the one word that's in bold print. See if you can identify the root word (or **base**) along with any prefixes and/or suffixes that are attached to it. After you have filled in all the blanks, compare your answers with those on page two.

1. We watched a **preview** of the new Pixar movie.

Root: _____

Prefix: _____

2. The dancing cat was seen by more than two-million YouTube **viewers**.

Root: _____

Suffix: _____

3. The **teacher** handed out paper hearts to the students who had done extra work.

Root: _____

Suffix: _____

4. The magician made the rabbit **disappear**.

Root: _____

Prefix: _____

5. At the end of his performance, the magician made a **graceful** bow to the audience.

Root: _____

Suffix: _____

6. Shyla asked the magician for his **autograph**.

Root: _____

Prefix: _____

7. Because of the **lightness** of the breeze, the sailboat moved quite slowly.

Root: _____

Suffix: _____

8. Despite the **heaviness** of his backpack, Jack raced up the hill.

Root: _____

Suffix: _____

UNIT X

FINAL EVALUATION

1. Reading

NANO TECHNOLOGY

History of Nano Technology

The first concept introduced by Richard Feynman in December 1959. Richard Feynman was a Physicist and in 1965 won a Nobel prize in Physicist. Nano technology was first invented by Prof Norio Taniguchi from Tokyo Science University in 1974.

What is Nano technology

Nano technology is the manufacture and use of material or a device on a small size very small I think. Material or a device occur on 1 until 100 nanometers. One nanometer it's mean same with 1 million meters (0,00000001 m). It's mean 50000 smaller from human's hairs. The scientists said 1 until 100nm as Nano scale, and the material as Nano crystals. Nano scale can be said unique, why? because there's not solid structure can be minimized. Other unique things are biological mechanisms will go on 0,1 till 100 nm. On these dimensions, the material shows different behavior, so the scientists hope to find a new effect on the Nanoscale and give new steps for technology.

The progress of Nanotechnology can be found in the products of the world. Examples are modifying catalysts on vehicles that reduce air pollutants, devices on the computer that can read and write to a hard disk, cosmetics that can block the danger of solar radiation, and sports equipment that can improve the appearance of the athlete. And now scientists are sure that they have uncovered potential from Nanotechnology.

Nowadays, Nanotechnology is growing, and everyone can't predict how to grow in the future. Scientists are sure that Nanotechnology will have an important effect on health, production, electronics, computers, sensors, security, and defense of the world.

The development of Nano Technology in Indonesia

In Indonesia, we also do not to lose. PT. Dirgantara Indonesia, in cooperation with Aerospace Electronics Technology Center of the National Aeronautics and Space Agency (LAPAN), designed a Nano satellite called Indonesian Nano-Satellite (Inasat-1). With smaller size and more efficient, it will have a positive impact for our technology. The nation doesn't dominate technology will be an audience and will be left behind from other countries. Nano technology will give an effect steel industry, decoration, polymer industry, sport, military, transportation, medical, electronics and beauty. Nano technology ruler's will allow a variety way for give value-added a product even creating value for a product.

QUESTION

1. Who is the first person that introduce nano technology ?
2. Why is the nano scale can be said unique ?
3. Mention impotent effect from Nano technology !
4. How is size nano scale ?
5. What is the advantage of Nano Technology ?

Exercise 2: Write a short paragraph about a visit you have made to some institution such as a school, college, university, bank, library, hospital, or factory.. Use the paragraph entitled *At Fairfax University* as a model. Events in the paragraph should be presented in time sequence. Begin your paragraph with these sentences: *I visited (place) (time).*

Exercise 3: Final Evaluation

Make a Script Proposal by using this format (For Example)

1. Title:

Possible Alternative Power Source

2. Background.
3. Purpose and Means:
 - a. Purpose.....
 - b. Means.....
4. Scope and An order.
 - a. Scope.....
 - b. An order

| | |
|------------|------------------------------|
| ChapterI | Introduction |
| ChapterII | Basic Theory |
| ChapterIII | Planning and Making a device |
| ChapterIV | Operating and Data Analysis |
| ChapterV | Conclusion and Suggestion |
| ChapterVI | Closing |

5. Approaching Method.
6. How to work.

BIBLIOGRAPHY

- Altman, H. B., & Strevens, P. (n.d.). *New Directions In Language Teaching*.
- Council, B. (1978). *English for Specific Purposes Milestones in ELT* (1st ed.). British Council.
- Fitria, T. N. (2020). *Teaching English for Specific Purposes (ESP) to the Students in English Language Teaching (ELT)*. *JET ADI BUANA*, 5(01), 55–66.
<https://doi.org/10.36456/jet.v5.n01.2020.2276>
- Hafids, Moh. (2018). *Basic-Academic-Writing* (T. dkk Antena, Ed.; 1st ed.). <https://doi.org/9766025177828>
- Ibbotson, M. (2008). *Cambridge English for Engineering* (1st ed.). Cambridge University P.
- Porcaro, J. W. (2013). *Teaching English for Science and Technology* (E. Teaching Forum, Ed.; 1Japan ed.). English Teaching Forum.
- Sentence and Paragraph Writing With over 100 writing exercises Basic Skills to Improve Writing*. (n.d.).
- Vladim, D. A. , dkk. (2020). *English For Engineering Students Part II* (D. A. , dkk Vladim, Ed.; 1st ed.). TOMSK Polytechnic University.
- Zemach, D. E., & Rumisek, L. A. (2003). *Academic Writing from paragraph to essay* (1st ed.). Macmillan.

AUTHOR BIODATA

Dr. Rachmat Setiawibawa, S.I.P., M.M., M.Tr.(Han)



Pria lahir di Bandung, 29 Januari 1968, Lulus S1 dengan Program Studi Ilmu Administrasi, S2 di Program Studi Ilmu Manajemen, S3 di Program Studi Ilmu Manajemen, dan mengabdikan diri menjadi prajurit TNI Angkatan Darat berpangkat Brigadir Jenderal dan saat ini menjabat sebagai Komandan Poltekad Kodiklatad. Selain mengajar, menjadi penulis aktif di beberapa kegiatan seperti pelatihan, sekolah kemiliteran, sertifikasi dan penelitian.

Theresia Dwi Siwi Candra Widiyati, S.E., S. Pd., M. Pd.



Wanita lahir tahun 1974, Lulus S1 di Program Studi Ekonomi Akutansi Universitas Katolik Widya Karya Malang Tahun, S1 di Program Studi Pendidikan Bahasa Inggris Universitas Negeri Malang Tahun, dan S2 di Program Studi Teknologi Pembelajaran Universitas Negeri Malang. Pengalaman kerja sebagai guru SMP, guru SMA, dan sebagai sekretaris di suatu perusahaan cargo terkenal di Surabaya sebelum mengabdikan diri menjadi prajurit TNI Angkatan Darat. Saat ini sebagai Dosen di Poltekad Kodiklatad. Selain mengajar, penulis aktif di beberapa majalah, jurnal ilmiah dan buku, kegiatan lain mengikuti pengembangan diri di bidang seperti pelatihan pengelolaan jurnal, pelatihan dan workshop pengelolaan dan pengembangan perpustakaan serta mengikuti sekolah atau diklat kemiliteran, sertifikasi dan penelitian.

Yudo Susantyo, S.S.



Pria lahir tahun 1970, Lulus S1 di Program Studi Bahasa Inggris di Sekolah Tinggi Bahasa Asing Malang Tahun 1994. Mengabdikan diri menjadi PNS TNI Angkatan darat sejak tahun 1991, dan sebagai Tenaga Pendidik Bahasa Inggris di Prodi Elka Sista Jurusan Teknik Elektronika, Prodi Otoranpur Jurusan Teknik Mesin dan Prodi Terasenmil Jurusan Balistik di Politeknik Angkatan Darat (Poltekad Kodiklatad). Selain sebagai Tenaga Pendidik, Penulis sehari-hari juga berkecimpung sebagai Tenaga Pustakawan yang mengelola sumber-sumber literasi yang ada di Perpustakaan Poltekad Kodiklatad hingga saat ini.