THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION AND VOCATIONAL TRAINING

Field Support Programme For Second Year Diploma Students

SELF STUDY MODULE

PHYSICS

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INTRODUCTION

This module contains eight units. Each unit consists of a number of sub-units. The subunits try to improve knowledge, skills and competence to you as student teachers. Your tasks while in field are as follows:

(a) To teach physics subject at school while applying theory learnt in college;
(b) To revise on all aspects learnt in physics at college;
(c) Perform activities provided in this module; and

Main competences to be developed will be ability to:

(a) Create and construct knowledge through a variety of methods;
(b) Demonstrate professional competency, ethics and commitment to work;
(c) Select and organize learning resources for effecting student activities;
(d) Use media and appropriate instruction technologies; and
(e) Conduct research and demonstrating innovativeness.

How to use the module.

You must perform all activities in this module. Relate the theory learnt in college with what is actually taking place in the real classroom context. Make reflection to your observation and make this as a base to your general field work reflections. Frequently consult senior staff members, colleagues and mentors for further assistance.

TOPIC ONE:
MEASUREMENT

In physics, measurement can be considered as the comparison of unknown physical quantity with a known fixed unit quantity.

This unit deals with measurement under three aspects:

- Physical quantities of measurement;
- Dimensional analysis and
- Error analysis.

1.1. Physical Quantities of measurement.

Measurement of any physical quantity can be traced back to only seven base quantities. This subunit is aimed at developing foundation knowledge on physical quantities of measurement.

Competence:

You will have ability to make measurements.

Learning activity 1

(a) Prepare a scheme of work to cover one term. One of the topics should be "measurement"

(b) From the scheme, plan a lesson on fundamental quantities of measurement and teach it.

(c) Prepare a quiz on measurement. Explain the steps involved in planning the quiz. Administer the quiz in class.

(d) Standardize the marks for the scores on the administered quiz.

Learning activity 2

What are the units for each of the following fundamental quantities?

(i) Electric current;

(ii) Thermodynamic temperature;

(iii) Amount of substance; and

(iv) Luminous intensity.

Learning activity 3

For every fundamental quantity in activity 2 above identify its SI units.

Learning activity 4

Using various sources find out the respective instruments used for measurements of the fundamental quantity.

Learning activity 5

Arrange for an experiment to determine acceleration due to gravity. As your students perform the experiment, investigate the skills they develop. Which competences do you think your students build in the experiment?

Learning activity 6

After you have taught the subtopic "Physical quantities of measurement", fill the physics logbook.

Learning activity 7

Describe seven fundamental quantities of measurement.

Self assessment question:

How the teaching of "measurement" has prepared you for your final examination?

1.2. Dimensional Analysis

Sometimes a scientist can forget the units of a certain physical quantity. Dimensional analysis techniques provide a way to analyzing the dimensions of physical quantities so as to identify them. This subunit will provide you with these dimensional analysis competences.

Competence:

You will have ability to make measurements.

Learning activity 1

Prepare some physics expressions with some mistakes on the units. Assign your students to investigate the improper units from the given expression. Use flash cards for this purpose.

What other strategies can you use for your students to analyze units from physics expressions?

Learning activity 2.

Using dimensional analysis find the SI units of velocity.

Learning activity 3.

When we analyse a formula so as to express the physical quantity, we obtain the dimensional formula. Obtain dimensional formula for each of the Physical quantities below.

- Area
- Volume
- Acceleration
- Density

Remember that the principle of homogeneity of a relation is dimensionally correct if the dimensions of the quantities are the same from each side of the relation.

Learning activity 4:

Use the principle of homogeneity to prove that the relation

$S = ut + \frac{1}{2} at^2$ is dimensionally correct.

Where S = displacement, u = initial velocity, a = acceleration, and t = time interval.

Learning activity 5

Check the correctness of the relation $\mathbf{T = 2\pi (l/g)^{0.5}}$

Where T = periodic time, l = length of a pendulum and

g = acceleration due to gravity.

What are the powers of f, m and r if $F=4\pi fmr$ where F=force, m=mass, f=frequency and r=radius.

Construct a test on conversion from CGS unit to SI units.

How can your test be moderated?

Self assessment question

What strategy do you have to prepare yourself for your final examination?

1.3 Error analysis.

Measurements taken by scientists are subject to human errors. However the errors contribute to uncertainties in the physical quantities measured and calculated. This subunit aims at developing ability to analyze the errors.

Competence:

You will have ability to trace and minimize errors in the measurement of physical quantities.

Learning activity 1

Ask your students to take measurements of known lengths, mass and time. Observe for deviations.

Learning activity 2

Describe the following terms as used in error analysis: True value, absolute error, mean absolute error and relative percentage error.

Explain how error is propagate in the following: Sum of quantities, Difference in quantities, product of quantities, Division in quantities, Powers of a quantity and graph.

Learning activity 3

Design an experiment and lead your students to perform it in class. Guide them to identify the source of errors.

How can you guide them to minimize the errors in the experiment?

Self-assessment questions:

Do you think you have done enough activities in this topic? Which area/problems do you need more help? (You may consult senior teachers or colleagues for more help)

TOPIC TWO:
MECHANICS

When a force acts on a body, it causes the body either to move or remain at its state. The branch of Physics, which deals with the study of forces, motion and the relationships developed, is called mechanics.

At A-level the study on mechanics concentrates on Newton's laws of motion, projectile motion, gravitation simple Harmonic Motion, Fluid mechanics and strength of materials. You are going to study more about motion in three dimensions, and the concepts of vector analysis.

2.1. Newton's Laws of Motion.

Newton discovered three concise statements which prescribe general tendency in rectilinear motion. These statements are called Newtons, laws of motion. They are basic foundation of kinematics. This subunit aims at providing you opportunity to study more about the laws.

Competences:

You will have ability to interpret and use Newton's laws of motion in daily life.

Learning activity 1:

Construct lesson notes on Newton's laws of motion for 0-level under the following areas:

- Identification of Newton's laws of motion;
- Application of Newton's laws of motion;
- Drawing vector diagrams of physical quantities;
- Determination of conservation of momentum;
- Determination of reaction forces; and
- Description of the motion under gravity.

Learning activity 2:

Having performed activity 1, how can you relate the same area for three-dimensional context?

Learning activity 3:

(a) Plan an experiment for your students to verify Newton's first and third laws of motion.

(b) Prepare physics test to cover Newton's laws of motion. What criteria and/or tools you used in constructing the test? Administer the test, standardize the scores obtained from the test results.

(c) Construct lesson notes for your revision purposes concentrating on the following areas:

- Application of Newton's laws of motion
- Vector diagrams
- Equilibrant forces
- Principle of conservation of momentum
- Reaction forces and
- Motion under gravity.

Self-assessment question;

Summarize things you have learnt in Newton's laws of motion.

2.2: Projectile motion;

A free falling body is subjected by acceleration due to gravity. The study on projectile motion allows us to trace paths of projectiles. This subunit is aimed at enabling you to study about projectile motion.

Competences.

You will have ability to relate and apply projectile motion in daily life.

Learning activity

Consider two cases of movement of a projectile. Case A: an object thrown upward from the ground at an angle. Case B: An object released from a moving aeroplane as it moves in air. Which of the two cases demonstrates motion along the horizontal? Sketch the paths for the two cases. Deduce equations for the projectile in the two cases.

Self-assessment questions.

What are the applications of projectile in daily life?

Write down your own notes on projectile motion.

2.3: Gravitation

Sir Isack Newton discovered attraction of any two particles in the universe. He discovered the law of universal attraction. Kepler comprehended the law through his three laws. Through the two physists's work gravitation has been known better. This subunit enables you to study gravitation.

Competence:

You will have ability to use the knowledge on gravitation to realize occurrence of physical phenomena.

Learning activity 1

Plan a lesson to teach about Newton's law of gravitational attraction.

Learning activity 2

Summarize the following areas and include in your portfolio.

Kepler's three laws of planetary motion: Derivation of Newton's law of universal gravitation from Kepler's laws; Mathematical relationship between g and G, Determination of mass and density of the earth Parking orbit, Velocity of escape and Weightlessness.

Self-assessment questions.

Which concepts did you cover under this topic? Can you now relate the concepts?

2.3. **Simple Harmonic motion (SHM)**

The study on SHM allows you to recognize repetitive and oscillating motion.

Competence:

You will have ability to apply SHM in daily life

Learning activity 1.

Perform SHM experiments by using (1) a spiral spring (b) Water in a U-tube.

Learning activity 2.

How the knowledge on SHM is applicable in daily life situations.

Self-assessment question.

Identify challenging areas in simple Harmonic Motion and contact your senior staff member or a college at neighboring school to discuss the challenges.

2.4: Fluid mechanics.

Motion and tendence in viscous liquids and gases is of a great interest since the motion in them is different from the ones in other media. This subunit enables you to trace the mechanics in liquids and gaseous media.

Competence.

You will have ability to relate fluid mechanics knowledge in real life situation.

Learning activity

Construct a bank of questions with 20 items applicable for your revision purposes on fluid mechanics with the help of senior staff members from your school. Find solutions to the questions.

Self-assessment questions

As you attempt problems in fluid mechanics, which concepts are still difficult?

TOPIC THREE:

WAVES

A wave motion can occur along a line, across a surface or throughout a space.

In this unit you will cover mechanical vibrations and properties of waves.

3.1. Mechanical vibrations

This subunit enables you to qualitatively and quantitatively study the wave motion. The subunit will cover both longitudinal and transverse wave forms.

Competences:

The activities set aim at developing your ability to:

(a) Produce and propagate different types of waves; and

(b) Demonstrate production and propagation of waves as seen in daily life experiences.

Learning activity 1.

Briefly, explain how you can use a helical spring to demonstrate production and propagation of longitudinal and transverse waves.

Learning activity 2

Consult different readings on waves and construct two questions for each of the following objectives;

- Describe the production and propagation of mechanical waves.
- Define free, forced and damped vibrations;
- Interpret the general formula for progressive waves:
- State the principles of superposition of waves; and
- Derive and explain the equations for stationary waves.

Self-assessment questions

Which area seems to be challenging when you studied waves at the college?

How did you address the challenges? Suppose you attempted questions in activity 2 above. What is your comment?

3.2. Properties of waves.

In this subunit you will study characteristics of waves.

Competence.

You will have ability to demonstrate properties of waves from your immediate environment.

> **Learning activity**
>
> Explain how each of the following teaching and learning resources can be used in the topic of waves; Ripple tank, Vibrator and Diffraction gratings.

Self-assessment question.

Life experience is full of wave knowledge including sound waves and water waves. What are the other phenomena of wave propagation? How can you extend the knowledge of properties of waves to your daily life?

TOPIC FOUR:
HEAT

This unit describes instruments for measuring temperature. It also deals with thermal conduction, convection and radiation.

4.1: Thermometry

The study of instruments used to measure temperature is of vast importance. As such, heat is the energy flowing between two points owing to their temperature differences. To effectively study heat one is supposed to study temperature; and by implication, instruments to measure temperature.

Competences:
You will have ability to:

- construct thermometers;
- Describe heat transfer processes.

> **Learning activity**
>
> Explain how you can guide your students to differentiate between heat and temperature.

Self – assessment questions

Summarize the study of thermometry you learned during the college phase.

Explain how can utilize the study of thermometry in your daily life.

4.2: Thermal conduction.

Competences:

You will have ability to use the immediate environment to describe thermal conduction.

> **Learning activity 1.**
>
> Use four rods of the same length and cross sectional area: Aluminum rod, Copper rod, brass rod; wood rod; and a hot water basin to compare conductivity of different materials.
>
> Explain how paraffin wax can be used to verity variation of thermal conductivity of the substances.

Learning activity 2:

Make your own notes on thermal conductivity. Identify some examples of thermal conduction phenomena in daily life situations.

4.3: Thermal Convection.

Some examples of convectional currents includes air, sound and water waves,. This subunit deals with thermal convection.

Competence:

Ability to construct a cooling system using locally available materials;

Learning activity 1:

Explain how can you enable your students to develop the concept of thermal convection using the following experiences; Convectional currents which form rainfall and Convectional currents in boiling water.

Learning activity 2:

Construct a simple cooling system using locally available materials and briefly explain how it works.

Self- assessment questions.

Identify several thermal convection phenomena in real life context. Can you relate the phenomena to the Newton's Law of cooling? Explain.

4.4: Thermal radiation

Thermal radiation is a process through which heat reaches the earth from the sun. This subunit covers thermal radiation.

Competences:

You will have ability to;

(a) Compare on radiant energy of different surfaces;

(b) Demonstrate absorption by radiation in daily life.

Learning activity 1

Explain how the following objects can be used to elaborate the concept of radiation to your students: The sun, Fluorescent tube, and burning charcoal.

Learning activity 2:

Make some lesson notes on the laws and theory on radiation. Put the notes in your portfolio.

Self-assessment questions:

(1) How is thermal radiation similar to or differ from the other thermal transfer processes?

(2) What area on thermal radiation did you find difficult? How did you worked it out?

TOPIC FIVE:

CURRENT ELECTRICITY

Electric current is used in almost every sector of the modern life. It is available at homes, industries, shopping centers etc.

In this unit you will concentrate on three major areas in the current electricity;

- Ohms law
- Electric power.
- Conduction metals, electrolytes and gases

5.1. Ohms law

The relationship between potential difference and current gives a constant of proportionality called resistance of a conductor. This is a study on Ohm's law.

Competence:

You will have ability to:

- Trace electric current circuits.
- Design and use different electric circuits.

Learning activity 1

Collect different wires whose resistances are known to you. Guide your students to determine the resistances by experimental method.

Learning activity 2

Investigate how electrical appliance technicians determine resistance of different conductors.

Learning activity 3

Study the color code way of reading the value of a resistor. Make some literature consultations for this case.

Learning activity 4

Through heuristic method allow your students to explore various circuits for the purpose of locating the resistors.

Self-assessment questions.

What challenges have you experienced in this sub unit?

Can you easily verify Ohms law?

5.2. Electric conduction in metals.

This subunit enables you to study how conduction in metals takes place.

Competences:

You will have ability to;

Apply the concepts of conduction in metals.

Learning activity 1

Lead your students to design different electrical circuits and investigate the flow of electric current. You can use circuits from radio repairers and other sources in your environment.

Learning activity 2:

Refer to the module and other book used in college; identify and perform experiments under this subunit.

Self-assessment questions.

(1) How was the experiment to verify ohms law helped you to understand electric conduction in metals?

(2) If you were to construct Wheatstone bridge;

(a) What materials do you think you need?

(b) Which materials can be improvised?

(c) Can receptivity of a wire of the bridge affect its efficiency? How?

5.3. Electric conduction in electrolytes.

How electrolytes conduct electricity? To answer such a question you need to study electric conduction in electrolytes.

Competences:

You will have ability to:

(a) Investigate the conductance in electrolytes;

(b) Measure back e.m.f. of voltameters; and

(c) Interpret the relationship between voltage and current for water voltammeters.

Learning activity 1:

By using a dry cell and various liquids and connecting wires guide your students to identify some liquids which can conduct electricity.

What can you comment on electric conduction in sea water as compared to distilled water?

Leaning activity 2:

(1) Explain how you conducted experiment to investigate the conductance of some electrolytes at college.

(2) Briefly explain how you interpret the graph of voltage against current for water and copper voltameters?

(3) Explain the concept of electrolysis in terms of molecules.

Self assessment question

Can you now explain why some liquids conduct current than others? Do you have examples of other electrolytes not delt with in the college phase?

5.4: Electric conduction in Gases.

Fluorescent tubes work in an interesting way. In them, electric current is conducted in gases. This subunit will analyze this phenomenon.

Competences:

You should have ability to;

(b) Investigate the electric current in gases;

(1) Relate electric conduction in gases with the mode of action of the fluorescent tubes;

(2) Determine optical spectra of gases; and

(3) Apply optical spectra knowledge in daily life.

Learning activity 1:

Prepare some notes for electric conduction in gases, post them on classroom walls and let your students pass through them.

Ask them to explain what they studied.

Are there any misconceptions from your students?

What happens if this process is repeated for the second time?

Class activity 2

(1) How the concept of optical spectra of gases is applied in daily life?

(2) What steps are followed in making Fluorescent tubes?

Self assessment Question

Can you make a fluorescent tube? What materials do you need?

5.5 Electric power.

It will be so shameful if a physist of your level is unable to explain how electric consumption units and costs are determined. This unit reminds you on electric power supply.

Competences; -

You should have an ability to:

(a) Interpret power rating

(b) Explain how Kwhr meter and Luku meter operate.

(c) Use electric power economically.

Learning activity 1:

Either visit a height boarding power supply office (TANESCO) or Consult senior staff members on how kWhr and LUKU meters work. Write a brief report.

Learning activity 2:

How does a 60W bulb differ from a 100W bulb?

Suppose a neighbor visits your school complaining of higher bills he/she receives currently as compared to previous months while he/she still have the same number of bulbs as the only thing that consumes electricity. You have investigated that the electric suppliers tariffs have not changed during the time the customer has noticed bills differences. How would you help him?

Self-assessment questions.

(1) Write your own lesson notes on the concept of electric power and interrelation of power rating.

(2) How guest – speaker strategy can help your students to develop knowledge on electric power?

TOPIC SIX:

ATOMIC PHYSICS

You are aware that, if a drop of water is magnified until it reaches the size of the earth, the atoms inside would then be only a few metres in diameter and the atomic nucleus would have a diameter of only about 10^{-2} mm.

You are also knowledgeable that when you are dealing with atomic physics you are concerned to such comparatively small particles.

To deal with nucleous and particles in it brings a lot of challenges such as comparison of relative masses and volumes of the constituent particles.

In this unit you will continue to learn about thermionic emission and radioactivity

6.1: Thermionoic emission.

When heat is supplied over metal surface, the surface ions escape just like when sun rays fall on water surface to cause evaporation of the surface water molecules. Through thermionic emission, cathode rays and later the X-rays have been discovered. This subunit helps you to study thermionic emission.

Competences

You are expected to have ability to:

(a) Visualize and bring compatible concepts to thermionic emission, cathode ray oscilloscope and the X-rays:

(b) Explain the application of cathode- ray-tubes in daily life; and

(c) Use the Cathode Rays Oscilloscope (C.R.O)

Learning activity 1:

Use the concept of evaporating water molecules to teach about therminioc emission as analogous concepts.

Learning activity 2:

Trace production of X – rays from the concept of thermionic emission. What challenges did you meet and how to rescue the situation?

Learning activity 3:

By using well-labeled diagrams explain how C.R.O. can be used to display: Sinusoidal waves and Half – wave rectified waves. How did you involve your students in the study?

Self-assessment questions

(1) If the school environment allows you to visit all places you wish, where would you visit to study about X – rays.

(2) How interesting and/or discouraging was, the study of thermionic emission.

6.2: Radioactivity

Emission of destructive radioactive rays is one of cross-cutting issues the world is concerned about. This area deals with how radioactivity takes place.

Competences:

You should have an ability to deal with radioactive substances.

Learning activity 1.

Trace radioactivity from 1896 discovery, where uranium compound was discovered to have affected a photographic plate to date. Write narrative report on your findings.

Learning activity 2.

Explain the uses of nuclear radiations. Differentiate among operations of Wilson cloud chamber, Geiger – Muller counter and spark chamber.

Self assessment.

Do you think you can clearly guide secondary school pupils on how they can work with radioactive substances safely? What key points you will emphasize on?

TOPIC SEVEN:

ELECTRONICS

Under this unit you will study about capacitors, resistors, inductors, semiconductors, transistors and integrated circuits. The use of these components is a base of the modern sophisticated electronic devices.

7.1 Capacitors:

Capacitors are important components in electronical and equipment telecommunication industry. Capacitors store charges.

Competences:

You will have ability to construct and use capacitors in different circuits.

Learning activity 1:

Observe various dismantled electronics devices such as radio receivers, television receivers and transmitter circuits to identify capacitors.

Learning activity 2:

Construct an air capacitor:

Learning activity 3:

Design an experiment on capacitors and show how capacitors work. How does capacitor store charges? Assuming the earth to be an isolated conducting sphere of radius 6400 km. What is the capacitance of the earth? Take E = 8.85 x 10^{-12} F/M (Answer:711 Mf)

Self – assessment questions:

As a teacher why do you need to know how to construct and use capacitors?

7.2: Resistors:

Resistors are found in almost every electronic appliance. What is it and how it works? Such questions are dealt with in this subunit.

Competences:

You will have ability to:

- determine the value of electronic resistor from its colors codes.
- Use resistors appropriately.

Learning activities.

Design an experiment on the mode of action of electronic resistor. Using demonstration guide your students to describe the values of different resistors picked from scrape electronic circuits. Calculate the resistance of a managing wire 100m long having a uniform E-section of 0.1 mm^2. Given that receptivity of managing wire is 5.0×10^{-7} (Answer; 500 ohm)

Self assessment question

What is the importance of resistors in electronic devices?

7.2; Inductors:

Inductance is the constant of proportionality when back e.m.f. varies with the rate of changing current per unit time.

Competences:

You should have an ability to construct and use inductors in electronic circuits.

Learning activities:

Construct a simple inductor and explain how an inductor works.

Self assessment questions:

(1) What is the use of inductors in electronic circuits? Can you now guide your students to construct a simple inductor? What steps should they follow?

7.2: Semiconductors.

This subunit deals with the study of semi conductivity.

Competences:

You will have ability to rectify signals.

> Learning activity 1:
>
> a) Distinguish intrinsic from extrinsic semi conductivity. Explain how to use the pn junction for half and full wave rectification.
> b) Write short notes to describe each of the following semiconductor devices: rectifier, diodes and Transistor.
> c) The applied input a.c. power to a half – wave rectifier is 40 watts. What is the rectification efficiency? What happens to the remaining 50 watts? (Answers; (a) 40%).
> d) In a common base connection IE = 1m A and Ic = o.95 mA. Calculate the value of I_B (Answers 0.05m A)

Self-assessment questions:

Do you fill that you now have enough understanding about semi conductors? What else would you like to know?

7.2 Transistors.

Where junction diode can only act as a rectifier, transistor is a current amplifier.

Competences;

You will have ability to:

- construct pnp and npn transistors
- Verify transistor characteristics.

> **Learning activity 1**
>
> You are given upn and pup transistor, battery resistors, and ammeter, voltmeter, connecting wire, switch and CRO. Design experiments to study transistor characteristics.

Learning activity 2:

Given 240 a.c. power supply (TANESCO Power) connecting wires, pu – diode, resistor and CRO. Design an experiment to display half-ware rectified waveforms.

Learning activity 3:

Write brief notes on transistor characteristics and transistor operations.

Self – assessment question.

What else would you like to learn about transistors? Discuss with colleagues.

7.3 Integrated circuits.

In integrated circuits one major components to describe is signal in electronic devices. The amplifires used have many transistors and are called operational Amplifiers (or Opamps).

Competences:

You will have ability to:

- Use logic gates and opamps;
- Ability to derive truth tables for various logic gates; and
- Ability to use logic gates and operational amplifiers.

Learning activity 1:

Construct simple inverting amplifiers and explain how it works.

Involvement your students to identify various amplifiers in your area.

Learning activity 2

Show how opamp can act as an integrator.

Self assessment

What is the importance of learning about integrated circutis?

TOPIC EIGHT:

GEOPHYSICS;

Under this topic you will continue to study about the earth with regards to its atmosphere, earths magnetic field, earthquakes and volcanoes.

8.1 The atmosphere

The study of atmosphere includes the layers which form it and temperature distribution across layers.

Competences;

Ability to describe the atmosphere.

Learning activity 1:

Assume you are moving from the earths surface across the atmosphere describe the vertical structure of the atmosphere in terms of its composition and temperature.

Learning activity 2:

Compare and differentiate the following terms; atmosphere, ionosphere and the magnetosphere.

Self assessment question:

Can you summarize the study of the atmosphere? What key questions your summary responds to.

8.2 Earth quakes and volcanoes.

Some of the catastrophic natural hazards threatening mankind include volcanic eruption and earthquakes.

Competences:

You will have ability to explain how volcanoes erupt and describe the intensity of the earthquake.

Learning activity:

Through library search trace out the recent earthquakes which occurred around mount Kilimanjaro and Volcano eruption of mount Oldony-lengai (2007) in Kilimanjaro and Arusha regions respectively. What are courses of; Earthquakes? Volcano eruptions?

Self assessment questions:

Why do you need to know about earthquakes and volcano eruptions? Do secondary school students need this knowledge?

8.3 Magnetic field of the earth.

You have learned that when a bar magnet is suspended and allowed to rest it always point to the same direction. What is that direction? Why so?

Competences:

(1) Ability to describe the magnetic parameters at a place.

(2) Ability to use the earth's magnetic field to magnetize and demagnetize magnets.

Learning activity 1.

Copy out a demonstration to measure magnetic parameters at a place on earth.

Learning activity 2.

Write short notes on the magnetic field of the earth.

Activity 3:

Write short notes on the following themes:

- Eccentric magnetic dipole of the earth;
- Long and short term variations of the earths' Magnetic field; and
- Magnetic parameters of the earth.

Self assessment:

Do you think you can effectively teach about magnetic field of the Earth in Secondary School? What are important points to make?