**EMERALD ROYAL INTERNATIONAL SCHOOL, MPAPE ABUJA**

**LESSON PLAN AND NOTE FOR WEEK 6 ENDING FRIDAY: 17th FEBRUARY, 2023**

**TERM:** 2nd

**WEEK:** 6th

**DATE** : 13th – 17th February, 2023

**SUBJECT:** Physics

**CLASS :** SS 2

**TOPIC: Electric Field**

**SUB - TOPIC:** 1. Arrangement of resistor and Ohm's law

1. Electrical energy and power
2. The fuse and circuit breaker, Continuity faults in electric circuit.

**PERIOD:** 3rd

**TIME:** 9: 30 - 10:10am

**DURATION:** 40 minutes

**AVERAGE AGE:** 16 years

**SEX:** Mixed

**SPECIFIC OBJECTIVES:** By the end of the lesson, students should:

1. Explain the arrangement of resistor and Ohm's law
2. Define electrical energy and power
3. Explain fuse and circuit breaker, continuity faults in electric circuit

**RATIONALE:** To enables students understand the concept of electric field

**PREVIOUS KNOWLEDGE:** Students have being taught electric field

**INSTRUCTIONAL RESOURCES:** Charts showing arrangement of resistors and circuit breaker

**REFERENCE:** Senior Secondary School Physics by P.N. Okeke et al, New School Physics for Senior Secondary Schools by Anyakoha, M.W, Comprehensive Certificate Physics by Olumuyiwa Awe and Okunola, O.O, Science Teachers Association of Nigeria Physics for Senior Secondary School, Book 1. New Edition and Melrose Physics for Senior Secondary School, Book 1 by Akano, O and Onanuga, O.O.

**LESSON DEVELOPMENT**

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| **STEPS** | **TEACHER’S ACTIVITIES** | **STUDENTS’ACTIVITIES** | **LEARNING POINTS** |  |  |
| **INTRODUCTION** | The teacher introduces the lesson by asking the following questions::   1. What is resistor? 2. Define Ohm's law? | The students respond based on their previous knowledge | To arouse the students interest toward the lesion. |  |  |
| **STEP 1** | The teacher explains the concept of electric fields and arrangement of resistors | The students pay attention. | To keep them focus. |  |  |
| **STEP 2** | The teacher explains electrical energy and power | The students pay rapt attention | To encourage critical thinking |  |  |
| **STEP 3** | The teacher explains fuse and circuit breaker, Continuity faults in electric circuit. | The students listen carefully | To ensure better understanding of the topic |  |  |
| **BOARD SUMMARY** | Sub- Topic 1: Arrangement of resistors and Ohm’s law  **Resistors can arranged in series and in parallel**    **When resistors are arranged in series in a circuit, the same current flows but, they have different potential differences.**  **When they are connected in parallel, they have the same potential difference but different current.**  **OHM’S LAW**  **The electric current passing through a metallic conductor is directly proportional to the potential difference applied between its end provided temperature and other physical property of the conductor remains constant.**    **V = IR**  **R is a constant of proportionality and depends on the nature of the material. The unit of resistance is ohm.**  **CALCULATIONS**  **1. A potential difference of 240V is applied to a lamp of 60 ohms resistance. What amount of current will flow in the circuit?**  SOLUTION    2. Calculate the effective resistance in the diagram  shown below.  2Ω  2 Ω  **4 Ω**  b. Calculate the current flowing in the circuit above    SOLUTION:  Solve the parallel first,    =1Ω  R =  b. Total resistance = 5Ω.  From Ohm’s law,      3. A current of 3A flows in a circuit when a p.d of 24V is applied to it. The resistance across the circuit is  Solution:  **Sub- Topic 2: Electrical energy and power**  **Electrical Energy**: If Q coulombs of electricity flows between two points whose potential difference is V volts, then the work done (W) is given by  W = QV  JOULES = COULOMB X VOLTS  But Q = It  Substituting Q = It;  **Electrical Power (P)**: Power is defined as the time rate of doing work.    **ELECTRIC METER READING AND BILLING**  To measure or read electricity consumed in order to bill the consumer accordingly, the standard unit commonly used is the kilowatt/hour.  1 unit of the electric power is the watt  1 watt= 1 volts x 1 ampere  Hence, the electrical meter is a device used for recording the number of units of electrical energy consumed in a house over a period of time.  1KWh = 1000 x 60 x60J  = 3.6 X 106 Joules of energy  The actual cost per unit to electrical energy varies with the nature of the use to which the energy is put.  The PHCN also charges a fixed charge and meter maintenance charge every month. This also varies according to the tariff rate of the consumer.  Example: 1. the tariff rate of a consumer is N4. 00 per unit. The present meter reading is 3760 units while the reading was 3648 units.   1. What is the consumption of the household after one month? 2. If the fixed charge is N30 and the meter maintenance charge is N100. What is the current charge of the consumer?   SOLUTION: i. the consumption of the household is the difference between the present reading and the previous reading.   1. – 3648 = 112units. 2. The energy charge of the consumer = 112 x 4. 00 = N448. 00k   Fixed charges = N30   1. Meter maintenance charge = N100   Current charges =N(448 + 30 + 100) = N578 . 00  **Sub- Topic 3: Fuse and circuit breaker, Continuity faults in electric circuit.**  **FUSE AND CIRCUIT BREAKER**  **fuse** is a safety device containing a short length of thin conducting wire, which melts and breaks the circuit, if the current exceeds a certain safe value or maximum operating limit.  **Circuit Breaker** on the other hand works in the same way as the fuse. It is usually placed beside the electric meter such that the current enters it first before going into the meter.  **Continuity Tester**: To detect faults in a circuit, we use a continuity tester. It is used to test whether a circuit is continuous or broken at a certain point.  Connecting wire  Electric bulb  Cell | The students copy notes into their exercise book | For future reference. |  |  |
| **Evaluation** | The teacher evaluates the students with the following questions   1. Explain the arrangement of resistor and Ohm's law 2. Define electrical energy and power 3. Explain fuse and circuit breaker, continuity faults in electric circuit | The students attempt the questions. | To ascertain their level of understanding. |  |  |
| **Conclusion** | The teacher concludes the lesson by making corrections where necessary and go through their notes. | The students copy the note on the board. | For future use. |  |  |
| **Assignment** | The teacher gives the students assignment as follows:  1. A cell of e.m.f 1.5V and internal resistance of 2.5Ω is connected in series with an ammeter of  resistance 0.5Ω and a resistor of resistance 7.0Ω. Calculate current in the circuit.  A. 0.15A B. 0.20A C. 0.60A D. 3.00A  2. Calculate the terminal potential difference across a 20Ω resistor connected to a battery of e.m.f  **GENERAL EVALUATION**   1. A car fuse is marked 15A and operates normally on a 12V battery. Calculate the resistance of the fuse wire.   **WEEKEND ASSIGNMENT**  1. Calculate the terminal potential difference across a 20Ω resistor connected to a battery of e.m.f 15V and internal resistance 5Ω.  A. 60.0V B. 15.0V C. 12.0V D. 6.3V  2. Two identical cells each of emf 2V and internal resistance 1.0Ω are connected in parallel. The  combination is connected to an external load of 1.5Ω. Calculate the current in the circuit.  A. 0.57A B. 1.00A C. 1.14A D. 2.00A  3. A car fuse marked 3A operates optimally on a 12V battery, calculate the resistance of the fuse.  A. 36.0Ω B. 15.0Ω C. 9.0Ω D. 4.0Ω  4. A lamp is marked 220V, 60W. Calculate the energy it would consume when connected to a  220V source for 1 hour.  A. 216000J B. 13200J C. 3600J C. 864J  5. Three identical lamps each of power 100W, are connected in parallel across a potential  difference of 250V. Calculate the current in the circuit.  A. 7.5A B. 2.5A C. 1.2A D. 0.8A  ESSAY  1. A television 65W, a refrigerator 12kW, an electric kettle 650W and 10 lamps 40W each are connected in series in a house. How much will it cost the housekeeper to switch on all the appliances for 24 hours, if the cost of electricity is 15 kobo per KWh?  2. An electric heater is rated 1000W, 250V.  a. Calculate the resistance of the heating element when in use.  b. If electricity is charged at N2 per kilowatt hour and the heater is used for 30min each day, calculate the cost per month for 30days. 15V and internal resistance 5Ω.  A. 60.0V B. 15.0 C. 12.0V D. 6.3V  3. A1600 Watts electric oven is used for 9 hours. Calculate the cost of using the N3. 00 per unit of energy. (Energy Consumed = power x time).What are the functions of the ammeter and voltmeter? | The students copy assignment solve at home and submit for marking endorsement. | To encourage further studying at home. |  |  |



22/3/2023

Principal Head Instructor