**EMERALD ROYAL INTERNATIONAL SCHOOL, MPAPE ABUJA**

**LESSON PLAN AND NOTE FOR WEEK 3 ENDING FRIDAY: 27th JANUARY, 2023**

**TERM:** 1st

**WEEK:** 3rd

**DATE** : 23rd - 27th January 2023

**SUBJECT:** Physics

**CLASS :** SS 1

**TOPIC:** Transfer ofHeat Energy

**SUB - TOPIC:** i. conduction

ii. convection

iii. radiation

**PERIOD:** 3rd

**TIME:** 9: 30 - 1:10am

**DURATION:** 40 minutes

**AVERAGE AGE:** 16 years

**SEX:** Mixed

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

1. Define conduction
2. Define convection
3. Define radiation

**RATIONALE:** To enables students understand the concept of heat transfer

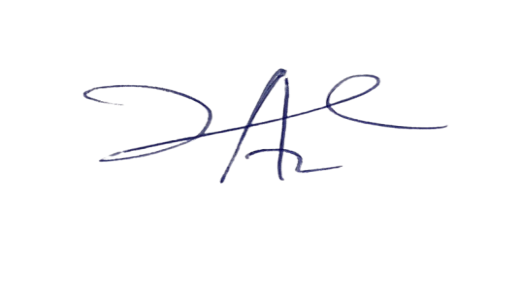
**PREVIOUS KNOWLEDGE:** Students have being taught transfer of heat

**INSTRUCTIONAL RESOURCES:** Charts showing transfer of heat

**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 conduction? 2. Define convection. 3. Define radiation | The students respond based on their previous knowledge | To arouse the students interest toward the lesion. |
| **STEP 1** | The teacher defines conduction and its application | The students pay attention. | To keep them focus. |
| **STEP 2** | The teacher explain convection and its effects | The students state the effects of heat | To encourage critical thinking |
| **STEP 3** | The teacher explain radiation and its application | The students participate. | To encourage retention ability. |
| **BOARD SUMMARY** | **Sub –topic** 1**. Meaning, molecular explanation of conduction and applications of conductors**  Conduction of heat is the process by which heat is passed along a material from molecule to molecule while the heated particles remaining in mean position. Most metals are good conductors but their thermal conductivities differ from one metal to another. Experiment performed to compare the conductivity of solid showed that copper is a better conductor than brass, followed by iron, lead...  **Using Kinetic molecular theory to explain conduction in solids**  Heat souce  A  B  C  Z  When the end A is heated, molecule A vibrate about its mean position with a greater kinetic energy and pushes the molecule B to do the same. Molecule B’s increase in kinetic energy is transferred to C and so on until this effect reaches Z. Soon the kinetic energy of molecule at Z is also increased. As the kinetic energies of the molecules increase, temperature increases and heat is then tranferred from the hot part to the cold part.  **Conduction in liquids:**  Liquids are poor conductors of heat except mercury and other molten metals. Experiment demonstrated below shows that water is a poor conductor of heat.  **Experiment to show that water is a poor conductor of heat.**  **Heat**  **Water boils here**  **Trapped ice-block in wire guaze**  Aim: To show that water is a bad conductor of heat.  Apparatus: water, test tube, ice-block, Bunsen burner and wire guaze.  Method: i. Wrap the ice block with wire guaze to prevent the ice from floating in water,  and drop in the water in the test tube.  ii. Heat the water near the top of the water with the Bunsen burner.  Observation: It is observed that while the water was boiling on top, the ice at the bottom  did not melt  Conclusion: The ice did not melt because water is a poor conductor of heat and was not able to conduct the heat to the ice.  **Applications of conductors and insulators**   * 1. Cooking utensils: Bad conductors of heat are used as handles while the cooking pots are made of metals such as aluminium which are good conductors of heat.   2. Lagging: Insulators are often used as lagging materials in hot water pipes, stem boilers, hot water storage tanks and ovens to prevent them from getting colder.   3. Warmth: Woollen sweaters keep us warm during winter or cold weather to prevent conduction of heat from the body.   4. Double walls: Houses built with double walls with space in between them have air trapped in the spaces that act as insulators, thus, keeping the house warm.   **EVALUATION:**  I. What is conduction?  2. Use the molecular theory to explain conduction.  3. Explain three applications of conductors and insulators.  **Sub –topic 2: Meaning, molecular explanation.and application of convection**  Convection is the process by which heat is transferred in a liquid or gas by **the actual movement of the heated fluid** from the hotter to the colder parts. Liquids and gases are poor conductors of heat but transfer heat by convection.  **Using kinetic Molecular theory to explain convection in liquid**  When a liquid is heated at the bottom of its container, the molecules there expand and becomes lighter. They therefore move to the top and are then replace by denser colder molecules from the top. The new dense molecules also get heated up and become lighter and hot then move to the upper part to be replaced by others. This action set up a convection flow of heat which continues until the water boils.  **Convection current**  **water**  **Applications of convection**  1. Land and sea breeze: This is convection current in nature. It happens in coastal area.   * + 1. Sea breeze: In a hot day the sun warms the air near the land quickly than the sea because the earth has a lower specific heat capacity than the sea. This warm air rises. Cooler air from the sea moves to replace the risen air. This cool breeze from the sea is known as sea breeze.      * + 1. Land breeze: at night, the air above the sea is hotter. There is a conventional flow of hot air from the sea rises up. They are replaced by cool air from the land. The flow of cool air from the land to the sea is called the land breeze.  1. Ventilation: Air heated by respiration and fires rises towards the ventilators placed near the ceiling. This is replaced by fresh air from windows and other openings. 2. Cooling of motor car engine: Car engines require cooling to prevent overheating. The heat generated by the engine is conducted by the metal to the water in the jacket. The water is cooled by the air circulating round the radiator as the vehicle moved and by the cool air from the fan 3. The Domestic hot water system: Water is heated in the boiler by conduction through the metal. Hot water rises by convection to the cylinder, cold water flows in to take its place.   **C:\Users\Anicho\Documents\My Received Files\IMAGE_294.jpg**  **To tap**  **EVALUATION**  **Describe an experiment to show Convection current in water.**  **Sub-Topic 3: Radiation, Emission and radiation by different surfaces, The Thermos flask.**  Radiation is the process by which heat is transferred from a hotter to a cooler place without heating of the intervening medium. ***Radiation is a mode of heat transfer that do not required a material medium for it transfer***. Radiation can be detected by a radiometer and a thermopile. A thermopile detects and measures radiant energy.  A black surface is a better radiator and absorber of heat than a polished / shining surface. This is why it is not advisable to wear a black cloth on a sunny day because one feels hot.  Polished surface, white surface and silvered surface are good reflectors of heat.  **Thermos flask**    This device is used to prevent loss of heat energy from its content  The three modes of heat transfer are prevented in the thermos flask in the following ways:  1.The vacuum between the double walled glass prevents loss of heat by conduction and convection.  2. The silver colour of the inside of the double walls prevents heat loss by radiation  3. The cork support, or plastic prevents heat loss by conduction.  4. The cork stopper prevents heat loss by conduction, evaporation and convection. | The students copy notes into their exercise book | For future reference. |
| **Evaluation** | The teacher evaluates the students with the following questions:   1. Define conduction 2. Define convection 3. Define radiation | The students attempt the questions. | To ascertain their level of understanding. |
| **Conclusion** | The teacher concludes the lesson by making corrections where necessary. | The students copy the note on the board. | For future use. |
| **Assignment** | **The teacher gives the students assignment as follows:**  1. Mention the features of the Thermo flask and explain how heat losses are prevented.  **WEEKEND ASSIGNMENT:**  1. Some water is heated in a pot. The major mode(s) of heat transfer within the water is/are by  A. conduction. B. convection C. radiation D. conduction and radiation  2. Which of the following statements is not correct?  A. A sea breeze is due to convection in air  B. Cotton materials are better than woolen ones for use in hot weather.  C. Convectional currents play an important role in the cooling of the engine of a motor car.  D. The vacuum space in a flask helps to reduce heat loss by radiation.  3. The heating element in an electric kettle is usually located near the bottom of the kettle because  A. water is a good conductor of heat.  B. heat can be more quickly radiated to all parts of the water.  C. no heat can be lost to the surroundings.  D. the convectional current which are set up can carry heat to all parts of the water.  4. Which of the following does not need a medium for heat transfer?  A. conduction B. convection C. Radiation D. Evaporation  **ESSAY**  a. Mention two modes of heat transfer other than convection.  b. Explain land and sea breezes.  c. Describe an experiment each to show  i. Convection current in water  ii. Aluminum is a better conductor of heat than wood.  iii. Water is a poor conductor of heat.  d. Describe an experiment to show that blackened surfaces are better heat absorbers  than shiny surfaces. | The students copy assignment solve at home and submit for marking endorsement. | To encourage the students to study at home. |



7/3/2023

Principal Head Instructor