**EMERALD ROYAL INTERNATIONAL SCHOOL, MPAPE ABUJA**

**LESSON PLAN AND NOTE FOR WEEK 1 ENDING 5TH MAY, 2023**

**TERM: THIRD**

**WEEK**:

**DATE** : **2ND - 5TH MAY, 2023.**

**SUBJECT:** **BIOLOGY**

**CLASS : SS 2**

**TOPIC : ENERGY TRANSFORMATION IN NATURE**

**SUB - TOPIC: 1**. **laws of thermodynamics.**

1. **Application of the first law of thermodynamics.**
2. **Application of the second law of thermodynamics.**

**PERIOD : 7th**

**TIME : 12: 30 - 1:00**

**DURATION : 40 minutes**

**AVERAGE AGE : 15 years**

**SEX:** **mixed**

**LEARNING OBJECTIVES:** by the end of the lesson,the students, should be able to;

1. Define the laws of thermodynamics.
2. Explain the applications of the first law of thermodynamics.
3. Explain the applications of the second laws of thermodynamics.

**RATIONALE:** the students should understand the laws of thermodynamics and its application.

**PREVIOUS KNOWLEDGE:** The students have been taught energy flow in an ecosystem.

**INSTRUCTIONAL MATERIALS:** chart showing the applications of the laws of thermodynamics in an ecosystem.

**Reference Material:** Essential Biology foe Senior Secondary School by M.C. Michael.

**LESSON DEVELOPMENT**

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| **STAGES** | **TEACHER’S ACTIVITIES** | **STUDENTS’**  **ACTIVITIES** | **LEARNING POINT** |
| **INTRODUCTION** | The teacher introduces the lesson by reviewing the previous lesson. | The students were active. | To arouse the students interest. |
| **PRESENTATION**  **STEP 1** | The teacher states the first and the second laws of thermodynamics. | The students pay attention. | To keep them focus. |
| **STEP 2** | The teacher asks the students to explain how the first law of thermodynamics is apply in an ecosystem. | The students state the system involved in coordination. | To encourage critical thinking. |
| **STEP 3** | The teacher explains how the second law of thermodynamics is apply in an ecosystem. | The students were active. | To keep them focus. |
| **BOARD SUMMARY** | **LAWS OF THERMODYNAMICS** Thermodynamics ordinarily means heat changes. Heat is a form of energy and how it can be changed or converted from one form to another and is governed by two laws. These laws are called first and second laws of thermodynamics.  **First Law of Thermodynamics**: The first law of thermodynamics states that energy can neither be created nor destroyed. In other words, the law states that energy can neither be created nor destroyed although it can be changed from one form to another.  **Second Law of Thermodynamics**: The second law of thermodynamics states that in any conversion of energy from one form to another there is always a decrease in the amount of useful energy. Put in another way, the law states that no transformation of energy from one state to another is ever 100 percent efficient. **Application of Both Laws to Ecological phenomena or Events** The ecological phenomena or events can be explained using the laws of thermodynamics Ecological phenomena or events in which the laws can be used to explain are food chain pyramid of energy and energy flow. **Food Chain** **a. Using the first law**: Energy in generated through the sun and is transferred from the producer to the final consumer. The green plant transfers the energy to the primary consumers which again transfer the energy to the secondary consumers. In all, the sum total of the energy remains constant.  **b. Using the second law**: Flow of energy cross different levels in a food chain .Transfer of energy between trophic levels is not 100% completely efficient successive levels have less energy and support few organisms, Primarily producers or green plants have the highest energy. When herbivores or primary consumers feed on primary producers, the energy level is reduced. When carnivores or secondary consumers feed on herbivores, the energy level is further reduced. Part of the energy is lost as heat at each trophic level.Not all parts of the preceding organisms are eaten by the predator or organism at the next trophic level. Energy is lost in the process of respiration or feeding or movement or metabolic activities.  **Pyramid Of Energy**  **(a) Using The first law**: It is discovered that energy is transferred from one trophic level to another. The energy of the producers at the base of the pyramid is higher and it is transformed gradually from one stage of the trophic level to another. Even though energy is transformed into various other forms in the successive trophic levels, the sum total of the energy is constant.  **(b) Using the second law:** As the energy is transformed from one trophic level to another. Part of it is converted into heat which is lost, causing a progressive drop in energy in successive trophic levels. **Energy Flow** **(a) Using the first law:**As the producers convert the solar energy to useful energy, this energy is progressively transformed from one trophic level to the next and so on. This means , energy flows from producers to primary consumers , then to secondary consumers and finally to tertiary consumers in a food chain. So the flow of energy in a food chain is in one direction only.  **(b) Using the second law:** The transfer of energy between trophic levels is not 100% or it is not completely transferred.Successive levels have less of useful energy and support fewer organisms or individuals lives. Primary producers to plants have the highest amount of energy. When herbivores feed on plants , the energy level is reduced. When carnivores consume the herbivores , the energy level is further reduced. | The students ask questions for further clarification. | To create room for slow learners. |
| **Evaluation** | The teacher evaluates the students with the following questions:   1. State the first and the second law of thermodynamics. 2. Explain application of the first law of thermodynamics. 3. Explain the application of the second law of thermodynamics. | The students attempt the questions. | To ascertain their level of understanding. |
| **Conclusion** | The teacher concludes by coping the note on the board. She checks and marks the note. | The students copy the note on the board. | For future use. |
| **Assignment** | Explain how energy is lost in an ecosystem. | The students did and submit their assignment for marking and correction. | To encourage the students to study at home. |



22/5/2023

Principal Head Instuctor