**EMERALD ROYAL INTERNATIONAL SCHOOL, MPAPE ABUJA**

**LESSON PLAN AND NOTE FOR WEEK 8 ENDING FRIDAY: 3rd MARCH, 2023**

**TERM:** 2nd

**WEEK:** 8th

**DATE** : 27th Feb – 3rd March, 2023

**SUBJECT:** Physics

**CLASS :** SS 1

**TOPIC: Energy and Environment**

**SUB - TOPIC: 1**. **Concept of energy**

1. **Types Energy**
2. **Conservation of mechanical energy**

**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 concept of energy
2. State the law of conservation of energy
3. Explain conservation of energy

**RATIONALE:** To enables students understand the concept of energy and environment

**PREVIOUS KNOWLEDGE:** Students have being taught Energy

**INSTRUCTIONAL RESOURCES:** Charts showing fields, bar magnets and properties of fields

**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 energy? 2. State the types of energy 3. What is conservation of energy? | The students respond based on their previous knowledge | To arouse the students interest toward the lesion. |  |
| **STEP 1** | The teacher explains the concept of energy | The students pay attention. | To keep them focus. |  |
| **STEP 2** | The teacher explains the law of conservation of energy | The students states the law of conservation of energy | To encourage critical thinking |  |
| **STEP 3** | The teacher states the sources and uses of energy | The students participate in the class discussion | To encourage students retentiveness |  |
| **BOARD SUMMARY** | **Sub topic 1: Concept of Energy**  **Energy** is the ability or capacity to do work. Its unit is Joules.  **Types of energy**  Energy exists in various forms some of which are;   1. Mechanical energy 2. Chemical energy 3. Solar energy 4. Heat energy 5. Sound energy 6. Electrical energy 7. Nuclear energy   **Mechanical energy**  Kinetic energy and potential energy constitutes mechanical energy. Kinetic energy is the energy a body possesses as a result of its motion. Potential energy on the other hand, is the energy possessed by a body because of its position. A body can also possess potential energy as a result of its nature. For example, an elastic material when stretched stores up energy (potential energy) which is given as ½ k e2 where k is what we call the elastic constant and e is extension in metres. Another form of potential energy is chemical potential energy which is energy stored up in a substance because of its chemical composition. Examples are; energy in the food we eat, electrolytes in cells or batteries.  Mathematically, Kinetic energy K. E = ½( mv2). m is mass in kilogram, v is velocity in m/s.  Examples of bodies that possess kinetic energy are   1. A rolling ball   ii. An object falling under gravity  iii. wind or air in motion  iv. An athlete running a race  v. A bullet movement  vi. A plane flying.  If a body is raised to a height h, its potential energy is given as   1. E = mgh. Where m is mass in kilogram, h is height in metres and g is acceleration due to gravity.   **Sub topic 2: Law of conservation of energy**  Energy as we have treated earlier exists in various forms. Although energy can be converted from one form to the other, the total energy remains conserved.  *This is the law of conservation of energy. It states that energy can neither be created nor destroyed but can be converted from one form to the other.* This law can be illustrated by mechanical systems as shown in the figures below.  height h  h  B  C  C hmax. V = 0 P.Emax. K.E = 0 A  h = 0. VmaxP.E = 0 K.Emax  A  B  C  VA = 0, hmax  VC = max, h = 0  VB  **Fig 1 Fig. 2**  **A body of weight ( w) lifted up to a height (h)**  hmax. V = 0 A P.Emax. K.E = 0 A    **Energy changes in a simple pendulum**  **For fig 1**   1. As the pendulum bob approaches A, the velocity reduces until it becomes zero at point A where it momentarily comes to rest; thereby making the KE zero. 2. Also at A, the bob attains its maximum height above the ground; thereby making the PE to be maximum. 3. as the bob returns towards B, the velocity increases and the height decreases such that at B, velocity is maximum (since KE = ½ mv2, KE is also maximum). 4. At B, height is zero, PE is equal to zero. 5. At the middle point either between A and B or B and C, energy is conserved. Hence, PE =KE   **In fig. 2**, as the body moves from the horizontal ground C to A, its velocity reduces and at point A, at height h, where the body is stationary, the velocity v is zero. Consequently its kinetic energy is zero but the potential energy is maximum. As the body drops to the ground, its velocity increases and the vertical height h reduces to zero. Therefore, potential energy just before it touches the ground is zero and the body has maximum kinetic energy. At point B, the body possesses both Kinetic energy and potential energy. From the two illustrations we see that although the energy changes from kinetic to potential energy and vice versa, the total energy of the system is conserved or remains unchanged.  Another example where it is applied is for a falling body.  h  P.EMAX  P.E +K.E K.EK  K.EMAX  **Example 1.** A ball of mass 8kg falls from rest from a height of 100m. Neglecting air  resistance, calculate its kinetic energy after falling a distance of 30m.  (take g as 10m/s2).  Solution:  Alternative solution;  **Example 2**  A body of mass 100kg is released from a height of 200m. With what energy does the body strike the ground? (g = 10 m/s2)  **Solution**  Gravitational potential energy is given as P.E = mgh = 100 x 10 x 200 = 200,000J  **Example 3**  A stone of mass 50.0kg is moving with a velocity of 20 m/s. calculate the kinetic energy  **Solution**  mass = 50.0kg, velocity = 20 m/s  K. E = ½ mv2 = ½ x 50.0 x 20.0 = 500J  **Sub-Topic 3: SOURCES OF ENERGY:**  The following are the sources of energy:   1. Energy from the sun (solar energy) 2. Wood (fire wood) 3. Coal 4. Electricity 5. Fossil fuels 6. Chemicals as in cells and batteries.   **CLASSIFICATION OF SOURCES OF ENERGY**  Sources of energy can be classified into:   1. Renewable sources of energy: These sources are not usually depleted as a result of usage. e.g, solar energy, tidal waves, wind, waterfalls and dams. 2. Non renewable sources of energy: These sources are usually reduced as they are being used. E.g, fossil fuels-coal, oil, natural gas and wood.   **USES OF ENERGY**   1. Solar energy is a universal source of light to planet earth. The plants also use it to manufacture their own food through photosynthesis. 2. Fire wood gives heat for cooking our food. 3. Energy from coal is used to boil water, then, produce steam used in steam engines. 4. Energy from waterfalls is used in hydro-electric power stations like kanji dam to produce electricity. 5. Natural gas, petroleum, diesel oil, etc are all derived from fossil fuels. 6. Chemical energy from cells and batteries are used to power our electronics and phones. | The students copy notes into their exercise book | For future reference. |  |
| **Evaluation** | The teacher evaluates the students with the following questions   1. Explain the concept of energy 2. State the law of conservation of energy 3. State the sources and uses of energy | 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 evaluates the students as follows:   1. Differentiate between potential energy and kinetic energy 2. What is the formula for calculating kinetic energy and potential energy 3. List eight forms of energy you know. 4. State the law of conservation of energy and apply it to any mechanical system 5. State the principle of conservation of energy. Using this principle explain how energy is conserved for   (i) objects falling under gravity  (ii) swinging of a simple pendulum bob.  6. A ball of mass 1kg is dropped from a height of 5m and bounces to a height of 10m. Calculate  (i) its kinetic energy just before impact. (ii) its initial bouncing velocity and kinetic energy. | The students copy assignment solve at home and submit for marking endorsement. | To encourage further studying at home. |  |



22/3/2023

Principal Head Instructor