



TOPIC: ENERGY TRANSFORMATION AND TRANSFER

SUBJECT: PHYSICS

LEVEL/AGE: 14 years old

FOREKNOWLEDGE: What are energy and energy transformations

LENGTH: 6 PAGES (DURATION: 110 MINUTES)

LEARNING OUTCOMES

At the end of this lesson, the students will be able to:

- Understand that there are different types of energy and energy transformations.
- List the different types of energy.
- Describe the type of energy before and after a change, and the energy transformations involved.
- State and explain what is meant by conservation of energy.



RESOURCES

Youtube video:
["Energy stores and transfers"](#) (Revision Monkey)

TEACHING METHODS

Video, lecture, teamwork, experiment

ACTIVITIES

INTRODUCTION (5 minutes)

Energy is all around us. Einstein's first law of conservation of energy, states that 'energy can neither be created nor destroyed; energy can only be transferred or changed from one form to another.' it is important to know the different types of energy and energy transformations from one type into another since they are a part of our everyday life- knowing them will make our lives easier!

REVISION (10 minutes)

The teacher will ask students if they know any types of energy or energy forms from everyday life. Then the students will watch this YouTube video: "[Energy stores and transfers](#)" by Revision Monkey. The teacher will then give time for questions.

THEORY PART (30 MINUTES)

Introduction to the types of energy. The teacher will explain the types of energy to the students and ask them for examples. The types that will be introduced are the following:

- 1. Heat energy** - This type of energy is created by the vibrations of atoms and molecules inside different substances. The faster they move, the more energy they have and the more heat they give off.
- 2. Radiant energy** - This type of energy is also known as light or electromagnetic energy. Radiant energy is a type of kinetic energy because it moves in waves.
- 3. Kinetic energy** - It is the energy released through movement. Someone going for a run is an example of energy.

4. Sound energy - Sound moves in waves and is generated when a force makes an object vibrate. Like banging on a drum. There is less energy in sound in comparison to some other kinds of energy.

5. Electrical energy - Electrical energy is the movement of electrons (tiny particles that are one of the building blocks of atoms). Electricity is electrons moving through a wire and they have electric energy.

6. Chemical energy - Chemical energy is found in atoms and molecules - it is the energy that holds these particles together. Chemical energy is stored energy that can be found in food, coal and natural gas.

7. Nuclear energy - Nuclear energy is stored in the nucleus of atoms. To release this energy either: nuclei are joined together (the process called fusion) or, the nucleus is split apart (called fission). Nuclear power plants use fission. They generate energy by splitting the atoms of plutonium or Uranium.

8. Elastic strain energy - This is a type of potential energy. The energy is stored in an elastic object, such as a spring or a string. They store elastic energy when a force, like a pull or a squeeze, causes them to be stretched or squashed.

9. Gravitational energy - This is the energy we get as a result of gravitational force on an object due to its position above Earth's surface.

The teacher then will explain how energy stores work through examples such as the following:

When you eat food, this is a type of chemical energy.

You transfer the energy into different stores.

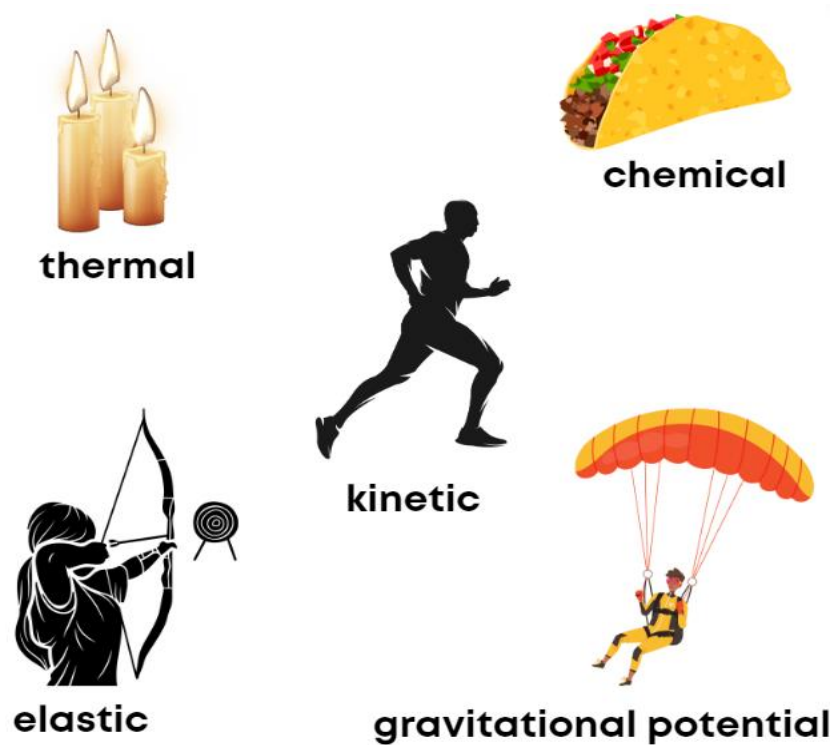
- Kinetic stores: when you move.
- Thermal stores: to maintain your body temperature.
- Chemical stores: when you make different compounds in your body.

Finally, the teacher will introduce students to the law of conservation of energy: **"Energy can neither be created nor destroyed - only converted from one form of energy to another. The total energy of an closed system remains constant."**

HANDS-ON PART (45 MINUTES)

The students will be given pictures depicting different scenarios and will have to match them with an energy store.

For example:



The students will then be divided into 6 groups and each group will be given a small experiment to execute:

Group 1: Light a candle and record the types of energy.

Group 2: Switch a electric torch on and off and record the types of energy.

Group 3: Place a toy car at the top of a ramp, record the type of energy, push the car to roll down the ramp and record the energy transformation.

Group 4: Lift a pendulum at 90 degrees (parallel to the floor), record the type of energy at the beginning, let it swing, and record the type of energy at the end of the activity.

Group 5: Switch the hair dryer on and off, record the types of energy.

Group 6: Use a switch to light up a bulb, and record the types of energy.

The students will then move to the next experiment circularly and record their findings in a spreadsheet.

Energy	Type of energy at the beginning	Type of energy at the end	Result
Lighting a candle	Chemical	Thermal	Light

After each group has completed each experiment, they share their results, and the teacher asks questions and makes corrections if needed.

EXERCISE PART (5 MINUTES)

Personal assessment for the students (or for a more engaging experience, the students can be divided in teams and answer the questions as a quiz): What is the main energy transfer taking place in a solar-powered calculator? What are the energy stores involved when using a camping stove? What are the energy stores and pathways involved when turning on an electrical radio?

CONCLUSION (3 MINUTES)

Energy is all around us. The law of conservation of energy states that 'energy can neither be created nor destroyed; energy can only be transferred or changed from one form to another, but the total remains the same.' It is important to know the different types of energy stores and energy transfers since they are a part of our everyday life - knowing them will make our lives easier!

SYNTHESIS/SUMMARY (10 MINUTES)

TYPES OF ENERGY:

CHEMICAL ENERGY

MOTION ENERGY

ELECTRICAL ENERGY

ELASTIC ENERGY

RADIANT ENERGY

SOUND ENERGY

GRAVITATIONAL ENERGY

TRANSFORMATIONS OF ENERGY:

CHEMICAL

KINETIC

THERMAL

MAGNETIC

ELECTROSTATIC

NUCLEAR

GRAVITATIONAL POTENTIAL

ELASTIC POTENTIAL

THE LAW OF CONSERVATION OF ENERGY

'ENERGY CAN NEITHER BE CREATED NOR DESTROYED; ENERGY CAN ONLY BE TRANSFERRED OR CHANGED FROM ONE FORM TO ANOTHER, BUT THE TOTAL REMAINS THE SAME.'

BIBLIOGRAPHY & RESOURCES

Revision Monkey. (2019, September 27). *Energy stores and transfers* [Video]. YouTube. <https://www.youtube.com/watch?v=VUworhvk5rw>