

3 Energy



Learning Objectives

After completing this lesson, students will be able to:

- ❖ know about different forms of energy.
- ❖ explain the energy changes in daily life.
- ❖ understand the law of conservation of energy.
- ❖ list out the uses of energy.



Introduction

Mala was standing in the row for her morning school assembly. Suddenly she fainted and fell down. Her class teacher rushed to her, took her to the class room and gave her water to drink. She came to know that Mala had skipped her breakfast. She was given some food and then she came back to normal. What do you understand from this?

We need energy to do our daily activities. We get this energy from the food. In science, energy is defined as capacity to do work. Let us study about different forms of energy and their uses in this lesson.



I. Different forms of Energy

We do many works in our daily life. Many of them are done physically. Some works are done with the help of instruments and devices. But, they need energy to work. There are different forms of energy like mechanical energy, heat energy, light energy, wind energy and so on. Let us study about them one by one.



Activity 1

Find out what do we need for the following.



To Drive bus



To dry cloth



To cook



To work in laptop

1 Mechanical Energy

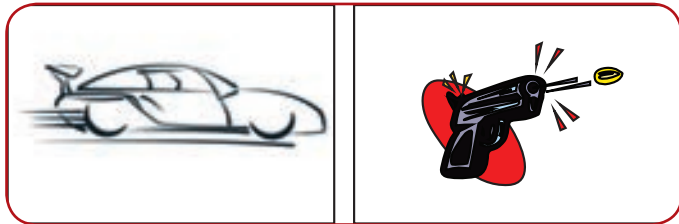
Energy possessed by an object due to its motion and position are called mechanical energy. Mechanical energy can be classified into two.

- Kinetic energy
- Potential energy

Kinetic energy

Energy possessed by a moving object is known as kinetic energy. It is also known as energy of motion.

Examples: Moving car, Cricket ball bowled by a player, Bullet coming out of a gun.



Potential energy

Energy possessed by an object which is at rest is known as potential energy. It is also known as stored energy of position.

Examples: Object lifted above, Stone in the stretched rubber, Water in the dam.



Uses of mechanical energy

Mechanical energy can be used to do many works. Some of them are given below.

- In hydro electric plants, kinetic energy of water is converted into electrical energy.
- Wind mills convert kinetic energy of winds into electrical energy.
- Mechanical energy of the hammer is used to apply a force on a nail.
- Mechanical energy can bring a moving body to rest and make a body at rest to move.





Activity 2

Find out the form of energy in the following.



2 Wind Energy

Energy possessed by the wind is known as wind energy.

Uses of wind energy

- Wind mills use wind energy to generate electricity.
- Ships sail by the power of wind.
- Sports like wind surfing, sailing, kite surfing use wind energy.
- Wind energy can be used for pumping water.



Do you know?

Tamil Nadu stands first in generating electricity from wind mills. Wind mills are located in places like Aaralvaimozhi, Kayatharu and Gudimangalam.



3 Heat Energy

When the temperature of a substance is raised, its atoms and molecules begin to vibrate and release a kind of energy. This energy is known as heat energy or thermal energy. This energy flows from a hot substance to a cold substance.

If we put some ice cubes into water in a glass, water becomes cold. It is because, heat is transferred from water to ice.



Do you know?

Heat is the total energy of the molecules in a body. Temperature is a measure of heat in a body.

Activity 3

Rub your hands together. What do you feel in your hands? Do you feel the heat generated by friction?



Activity 4

Take a small amount of lime powder in a glass. Add some water and stir well. Touch the glass outside. How do you feel?



In both the cases, you can feel the heat. Thus, heat is produced by friction and chemical reactions also. Sun is the primary source of heat energy.

Uses of heat energy

- Heat energy obtained from power stations is used to generate electricity.
- Heat energy obtained from petrol and diesel is used to run vehicles.
- We cook food with the help of heat. Heat energy renders the food material soft and easy to digest.
- Hard substances like iron are heated to mold them into different shapes.
- Heat is used to dry cloths and other wet substances.



4 Light Energy

Light is a form of energy which travels in the form of wave. It contains a particle called photon which are the minute packets of energy. It is the only form of energy visible to human eye. Light does not require any medium to travel. It travels at a speed of 3,00,000 km/s. Sunlight takes 8 minutes to reach earth.

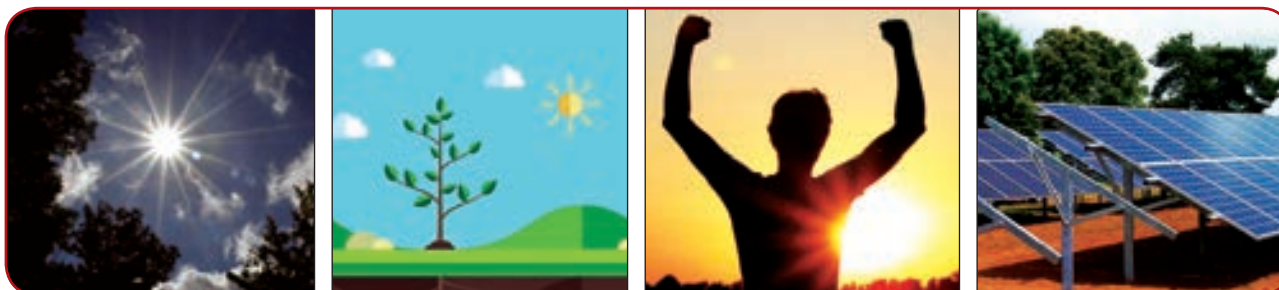


Do you know?

Study of light is known as Optics.

Uses of light energy

- We are able to see objects with the help of light energy.
- Plants use light energy to synthesis their food.
- With the help of light energy, our skin is able to synthesis Vitamin-D.
- Electricity can be produced with the help of light energy.



5 Electrical energy

We know that all things are made up of atoms. Atoms posses particles like protons, electrons and neutrons. Movement of electron in the objects causes an energy. This energy is called electric energy. In our daily life we use batteries to get electric energy. Electric energy is also generated from nuclear power plants, hydroelectric plants and wind mills. It is also generated from solar energy.



Do you know?

'Electric eel' generates electric energy. It uses this energy to defend itself against its predators.



Uses of Electric energy

- Electric energy is needed for the working of fan, light, television, washing machine, refrigerator etc.
- Electric iron box, electric stove and electric water heater work by electrical energy.
- It is used to run cars and trains.
- It is used in factories to produce materials.

Activity 5

Mention a few places where electric energy is generated in power plants.



Nuclear plant	Hydroelectric plant	Thermoelectric plant



6 Chemical energy

Chemical energy is stored in substances when atoms join together to form chemical compounds. When two or more chemical substances react with each other, this energy is released.

Uses of chemical energy

- The food we eat contains chemical energy.
- Chemical energy in wood provides heat energy which helps us to cook food.
- Chemical energy in coal is used to generate electricity.
- Batteries we use in our daily life contain chemical energy.
- Fuels like petrol and diesel possess chemical energy which is used to run vehicles.

Activity 6

Observe the stove burning in your kitchen. Do you see the light and feel the heat? Where do you get these from?



II. Conservation of Energy

Energy cannot be created and it cannot be destroyed also. It is changed from one form to another form or transferred from one object to another object. We can say many examples for conservation of energy in our daily life.

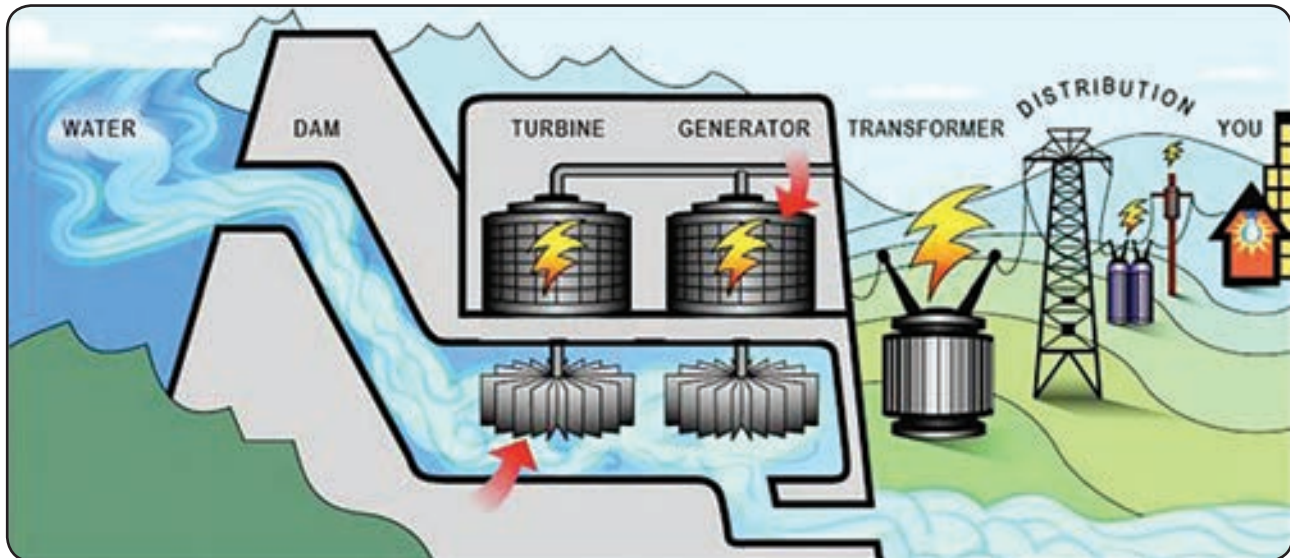
1 Water Dam

Water stored in water dams possesses potential energy. When water falls down, potential energy of water is converted into kinetic energy. Kinetic energy of water rotates the turbines and electric energy is generated.



Do you know?

Law of conservation of energy states that energy can neither be created nor be destroyed. One form of energy is converted into another form of energy. This law was given by Julius Robert Mayar.



2 Electrical Appliances

Electric energy is used in many domestic appliances such as electric stove, iron box and fan. Electric energy flows into the coil in the devices. As current flows, it heats up the coil. With the help of this heat energy, we do many useful works. Thus, electrical energy is converted into heat energy. Electrical energy is converted to mechanical energy in fan, light energy in bulb and sound energy in computer.



Heat Energy



Light and Sound Energy



Light Energy



Mechanical Energy

3 Driving a Car

We use fuel in the form of petrol or diesel or gas to run vehicles. When this fuel burns in the engine, chemical energy is converted into heat energy. Burning fuel produces hot gases which push the piston in the engine to move the vehicle. Thus heat energy is converted into mechanical energy.

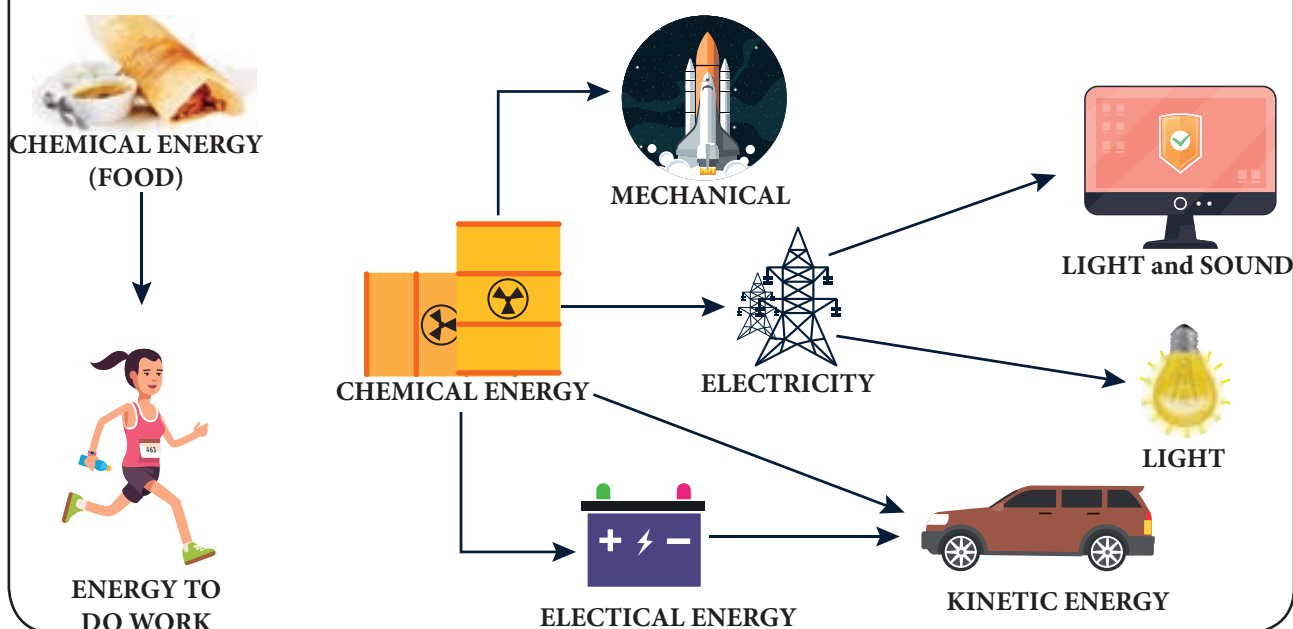


Do you know?

Photosynthesis changes solar energy into chemical energy.



Conservation of Energy



Evaluation



I Choose the correct answer.

- When diesel is burnt chemical energy is converted into _____
 a) wind energy b) heat energy
 c) solar energy d) sound energy
- Running water possesses _____
 a) potential energy b) chemical energy
 c) kinetic energy d) sound energy
- Unit of energy is _____
 a) Kilo gram b) Newton
 c) Kelvin d) Joule
- Which one of the following requires wind energy?
 a) Bicycle b) Photosynthesis
 c) Parachute d) Automobiles
- Cow dung possesses _____
 a) kinetic energy b) chemical energy
 c) solar energy d) heat energy



II. Find out the energy conversion that takes place in the following.

1. Iron box : Chemical energy → Heat energy
2. Electric Iron box : _____ → _____
3. Electric fan : _____ → _____
4. Speaker : _____ → _____
5. Generator : _____ → _____

III. Find out the form of energy possessed by the following things.

1. A rock on the top of a hill
2. A rolling ball
3. Charcoal
4. Water falls
5. Battery

IV. Match the following.

Electric bell	-	Solar energy
Water in dam	-	Light energy
Solar heater	-	Electrical energy
Wind mill	-	Potential energy
Torch light	-	Sound energy

V. Say True or False.

1. An apple falling from a tree is an example for kinetic energy.
2. Electrical energy is used to run electric trains.
3. Heat energy cannot be produced by friction.
4. Potential energy and heat energy are the two forms of mechanical energy.
5. The unit of energy is Joule.

VI. Answer in brief.

1. What is energy?
2. What are the different forms of energy?
3. What are the uses of mechanical energy?
4. State the law of conservation of energy.
5. Give the uses of light energy.

VII. Answer in detail.

1. Explain the types of mechanical energy.
2. Explain conservation of energy.

