

### Forms of Energy

The ability to do work or cause change is called energy. Energy comes in many different forms. In physics, the law of conservation of energy states that the total energy of an isolated system remains constant—it is said to be conserved over time. Energy can neither be created nor destroyed; rather, it transforms from one form to another. There are two basic kinds of energy; kinetic energy and potential energy.

The word kinetic comes from the Greek word kinetos, which means “moving.” An object that has motion, whether horizontal or vertical, has kinetic energy. The kinetic energy of an object depends on both its mass and its velocity. The greater the mass and velocity, the greater the kinetic energy. The heavier an object is and the faster it moves, the more kinetic energy it has.

An object does not have to be moving to have energy. Some objects have stored energy due to their position or shape, this type of energy is known as potential energy. If you wind a toy you are transferring energy to it. That energy might be used later when the toy unwinds. This type of energy has the potential to do work.

Mechanical energy is the sum of kinetic and potential energy. It is associated with the position and motion of an object. For example, a moving truck has mechanical energy because of its motion. Mechanical energy exists in every system in the universe. It is found everywhere, from a leaf falling to the ground to a hammer driving a nail. Mechanical energy turns, throws, twists, pushes and pulls.

Thermal energy is the vibration and movement of atoms and molecules within substances. This type of energy comes from heat. This heat is generated by the movement of tiny particles within an object. The faster these particles move, the more heat is generated. In order to convert thermal energy into other forms of energy, a machine such as an engine is needed. An example of thermal energy is when you add ice to a warm drink, some of the drinks’ thermal energy is transferred to the ice which makes the drink cooler.

Electric energy is the energy created by electrons moving through an electrical conductor. The world is made of matter. All matter contains atoms that contain electrons that are always moving. When electrons are forced down a conductive path, such as a wire, the movement produces electricity, or electric energy. Depending on whether the charges are moving or stored, electrical energy can be a form of kinetic or potential energy. You can rely on electrical energy from batteries or electrical lines to run devices such as flashlights.

Almost everything you see, touch, or taste is composed of chemical compounds. Chemical compounds are stored in the bonds of atoms and molecules. This type of energy is potential energy stored in the chemical bonds that hold chemical compounds together. Chemical energy is stored in the food you eat, in the matches you can use to light a candle, and even in the cells of

your body. When bonds in chemical compounds break, the chemical compounds may form. When this happens, chemical energy may be released.

A nuclear energy is a type of potential energy that is stored in the nucleus of an atom. This type of energy is released during a nuclear reaction. An example is when nuclear power plants use fission reactions to produce electricity. Nuclear fission is when a nucleus splits. Another kind of reaction is known as nuclear fusion, this occurs when the nuclei of atoms fuse, or join together.

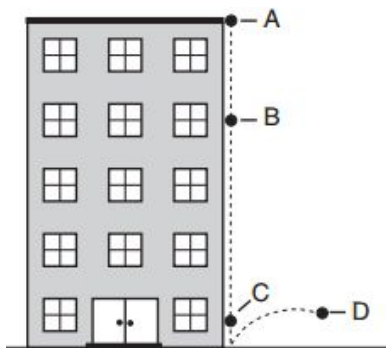
The sunlight that you see each day is a form electromagnetic energy. This type of energy travels in waves; these waves have some electrical properties and some magnetic properties. Other forms of electromagnetic energy include ultraviolet radiation, infrared radiation, and radio waves.

Energy exists in many different forms. Above are just 8 different types of energy. More forms include but are not limited to; light energy, heat energy, gravitational energy, sound energy, atomic energy and so on. These forms of energy can be transferred and transformed between one another.

1) Define energy. \_\_\_\_\_

2) What is the law of conservation of energy? \_\_\_\_\_

3) A ball is dropped from the roof of a building. Points A, B, C, and D in the diagram below represent positions of the ball as it falls. Circle the position the ball will have the greatest kinetic energy.



4) What two forms of energy combine to make mechanical energy? \_\_\_\_\_

5) What kind of energy do you experience when you eat a peanut butter and jelly sandwich? \_\_\_\_\_

6) What form of energy are microwaves? \_\_\_\_\_

7) Fill in the table below.

Forms of Energy	Definition	2 Examples
Kinetic		
Potential		
Mechanical		
Thermal		
Electrical		
Chemical		
Nuclear		
Electromagnetic		

Base your answers to questions 8 and 9 on the data table below and on your knowledge of science. The data table lists the amount of energy input, amount of heat produced by friction, and amount of energy output for each of four machines, A, B, C, and D. Both energy and heat are measured in units called joules. The heat produced by friction for machine D has been left blank.

**Data Table**

Machine	Energy Input (joules)	Heat Produced By Friction (joules)	Energy Output (joules)
A	100	30	70
B	100	10	90
C	100	25	75
D	100		60

8) How much heat was produced by friction in machine D? \_\_\_\_\_ joules

9) Explain how the data table shows that machine B is the most efficient. \_\_\_\_\_

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