

Learning Objectives

- 1) Understand energy and how it relates to work. Energy is the ability to cause changes in matter, or the ability to move matter. Work is done when a force, produced using energy, changes the motion of an object. Work has three requirements: a force is needed, an object is needed and the force must move the object. If one pushes on an object, and it does not move, no work is being done because it is missing one of the three components of work (movement).
- 2) Identify and explain the different classes of energy.
 - a) Mechanical energy is the type of energy an object has because it is moving or it can move.
 - b) Chemical energy comes from a chemical change. When chemicals act on each other, the energy inside them is set free. Burning fuels, like gasoline or coal, produce chemical energy.
 - c) Thermal (heat) energy moves the particles of matter, called molecules, which make up all things. These molecules are constantly vibrating. When heat waves hit molecules, the molecules move faster; these faster moving molecules hit each other and spread farther apart. It is thermal energy that causes ice to melt and water to boil. Much of the thermal energy that is present on the earth comes from the sun. In addition, thermal energy spreads out in all directions.
 - d) Just like heat, most of the light energy that the earth uses comes from the sun. This light energy travels in waves and can move through millions of miles space. This light energy is converted into chemical energy by the leaves of plants during a process called photosynthesis; this chemical energy is stored in the bonds of sugars and starches; these sugars and starches are stored in the fruits, roots, stems, and leaves of plants. The light energy that plants convert into chemical energy is used by all living things to survive. Not only do plants use the energy to grow and change, but animals eat plants to obtain the high-energy starches and sugars that the plants store so they may also grow and change.
- e) Sound energy is produced when an object moves or vibrates; it travels in waves through air, water, and other types of matter.
- f) Electrical energy comes from the flow of electricity; it powers our computers, televisions, and light bulbs.
- 3) Observe that energy is neither produced nor destroyed, it is simply converted from one form to another. Examples of energy conversion include:
 - a) Photosynthesis converts sunlight energy to chemical energy.
 - b) Animals convert chemical energy (from starches and sugars) to mechanical energy so that they may move.
 - c) Thermal energy from the sun is converted into wind energy, which hits a windmill and is turned into mechanical energy. The mechanical energy spins a generator that converts mechanical energy into electrical energy.
- 4) Realize that there are two basic kinds of energy, Kinetic and Potential.
 - a) Kinetic energy is the energy of motion; any object that has movement, has kinetic energy.
 - b) Potential energy is stored energy, or in other words, it is the energy something has due to its position. When a rubber band is stretched, kinetic energy is being converted to potential energy. When the rubber band is let go, the potential energy is converted back into kinetic energy.

Suggested Activities

- 1) Outside Activity: In a large area, have students spread out, using their arms as spacers. Give each student a bouncing ball. Review with students that potential energy is energy of position and kinetic energy is energy of motion. Using the bouncing ball, have students demonstrate these two basic types of energy. If you let the ball bounce more than once, you can demonstrate potential energy changing to kinetic energy and back again.
- 2) Scavenger Hunt: After watching the video, students should understand that one form of energy can change into another form of energy. Divide the class into small groups and have them make a list of many ways that energy changes. Encourage them to look through magazines, look around the classroom, or even outside. They may be surprised at all the kinds of energy they can recognize.

Vocabulary

Atom — Extremely tiny particles of matter that build molecules

Matter — Anything that exists, meaning it takes up space and has mass

Molecule — Tiny particles of matter that make up all objects

Wave — A disturbance that transfers energy from one point to another

