14-1 What is energy?

Objective

Compare potential energy and kinetic energy.

Key Terms

energy: ability to make something happen

potential (poh-TEHN-shuhl) **energy:** stored energy

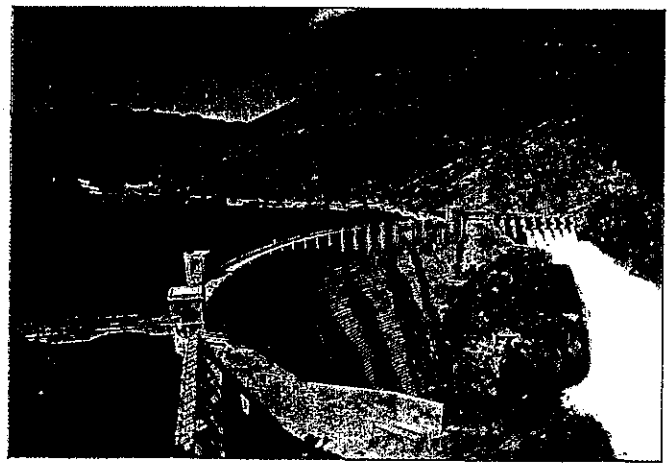
kinetic (kih-NEHT-ihk) **energy:** energy of motion

Energy Look at the picture of the dam in Figure 14-2. If you have ever taken a shower or stood out in the rain, you know that falling water has energy. The energy of the water falling through the spillways of a dam can be used to generate electricity. However, did you know that the quiet water in the lake behind the dam also has energy?

Energy is the ability to make something happen. There are two general kinds of energy. These are potential energy and kinetic energy.

1 **DEFINE:** What is energy?

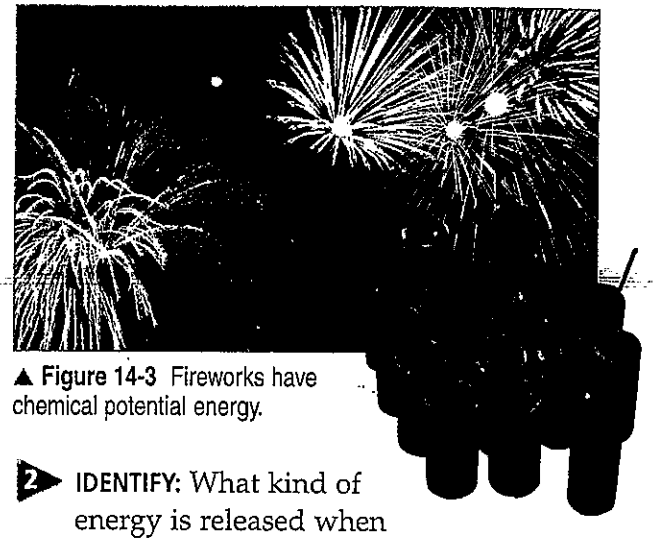
Potential Energy **Potential energy** is stored energy. The energy of the water in the lake behind the dam in Figure 14-2 is potential energy. The water has energy because of its position. Gravity can cause it to fall to the river below the dam. This kind of stored energy is called **gravitational potential energy.**



▲ **Figure 14-2** The water above this dam has gravitational potential energy.

The gravitational potential energy stored in a sample of matter depends on two factors. These factors are weight and height. The more weight an object has, the more potential energy it has. Potential energy also depends on height. The farther an object has to fall, the more potential energy it has.

The fireworks in Figure 14-3 have a different kind of potential energy called **chemical potential energy.** This potential energy is stored in the chemicals in the fireworks. When the fireworks are set off, the potential energy stored in the chemicals is released as heat, light, and sound.



▲ **Figure 14-3** Fireworks have chemical potential energy.

2 **IDENTIFY:** What kind of energy is released when you strike a match?

Kinetic Energy **Kinetic energy** is energy of motion. Anything that is moving has kinetic energy. When you walk or run, you have kinetic energy. Like potential energy, kinetic energy also depends on two factors. With kinetic energy, the factors are mass and velocity. The faster you move, the more kinetic energy you have. The more mass a moving object has, the more kinetic energy it has.

Think about a car and a truck moving at 30 mph. The truck has the greater mass. So, even though both vehicles are traveling at the same speed, the truck will have more kinetic energy than the car.

Name _____ Class _____ Date _____

14-1 What is energy?

Lesson Review

Answer the following questions.

1. What is potential energy? _____

2. When a baseball player is holding a bat, what kind of energy does the bat have? _____

_____

3. When a baseball player is swinging a bat, what kind of energy does the bat have? _____

4. Two people of the same mass are running a 5-k race. One person is running at a pace of 15 km/h, while the other is running at a pace of 12 km/h. Which runner has more kinetic energy? Why?

_____

_____

5. Two people are walking to school at a rate of 5 km/h. One person weighs 600 newtons, and the other weighs 555 newtons. Which person has more kinetic energy? Why? _____

_____

6. What two factors determine an object's gravitational potential energy? _____

_____

7. A 50-kg stone and a 70-kg stone are raised to the same height above the ground. Which has more gravitational potential energy? Why? _____

_____

Skill Challenge

Skill: *classifying*

Each of the following items has potential energy or kinetic energy. Write *PE* for potential energy or *KE* for kinetic energy in the space provided.

_____ 1. water falling over a dam

_____ 2. water in a cup

_____ 3. park bench

_____ 4. moving car

_____ 5. rock on the ground

_____ 6. racing sailboat

_____ 7. running dog

_____ 8. falling raindrop

_____ 9. parked car

_____ 10. rolling ball