

**CONNECTION TO LANGUAGE ARTS****● The Concept of Energy**

Starting in the late 1500s, Galileo Galilei performed a number of experiments that have had an enormous influence on the sciences. Galileo examined the behavior of moving objects in many of these experiments to try to understand more about the nature of forces.

Among other things, he discovered that the *work* (the force multiplied by the distance over which the force is exerted) required to lift a weight on a pulley remains constant even though the force or the distance may vary. Because one definition of energy is *the capacity to do work*, this discovery marks the beginning of one modern concept of energy.

**Philosophers Contributed to Our Understanding of Energy**

The next step in discovering the law of conservation of energy was made by René Descartes, the French philosopher. He developed the idea that motion is conserved in all physical interactions. Descartes expressed motion by multiplying an object's mass by its velocity. In contrast, the German philosopher Gottfried Leibniz proposed that the fundamental unit of motion should be expressed by multiplying an object's mass by its velocity *squared*. Leibniz called this value ( $mv^2$ ) the "vis viva," or living force.

In 1807 an Englishman, Thomas Young, was the first to use the word *energy* in the sense in which we use it today. In today's terms, the vis viva is equal to twice the kinetic energy of a body, while Descartes' motion is equal to the momentum of a body.

**Your Turn to Think**

1. Which philosopher developed the idea that motion is conserved in physical interactions?
2. Who was the first person to use the word *energy* in today's modern sense?
3. How were Galileo's discoveries important to the development of the concept of energy?
4. In modern terms, what is the *vis viva* equivalent to?