

## Station H: Physics

1. **Read the information about physics and list major achievements.** Carefully read and discuss the information below about the ancient Greeks' achievements in the field of physics. Then, list three major ancient Greek achievements in the field of physics in the Station H section of **Student Handout 4.1A**.

The ancient Greeks made several important contributions in *physics*, the scientific field that studies matter and energy and the way they interact. The Greeks sought to understand what elements make up all physical things around us, which we call *matter*. Greek myths stated that everything in the world is made of earth. Then, one Greek scholar suggested that water was the basic component of all matter because water appears in three forms. Water is a liquid in its natural state, a gas when it is steam, and a solid when it is ice. Another scientist insisted that air was the basic substance in all things. He argued that when air thickened, it first produced wind and clouds, and then water, earth, and stone; when it thinned, air created fire. A third Greek proposed that fire was the primary element of all matter. He believed that fire could become a gas and then thicken into water. Still a later thinker proposed that all four of these elements—earth, water, air, and fire—were the basic building blocks of all matter.

The Greek philosopher Democritus (pronounced dih-MAH-krah-tuss) came closest to modern-day beliefs with his theory. He suggested that unchanging *atoms* make up all things. These atoms—from the Greek word *atomos*, which means indivisible—are too small to be seen, even with a microscope. They exist in different sizes and shapes, and when they combine, they form different objects. Today, scientists have identified three primary parts of the atom. *Protons* with positive electrical charges and *neutrons* with no charge make up the center of the atom, called the *nucleus*. *Electrons* with negative charges whirl around this nucleus.

An atom is held together by the electrical attraction between the nucleus and the electrons. When an object that is negatively charged comes into contact with an object that is positively charged, they will attract each other. When two objects that are positively charged or two objects that are negatively charged come into contact, they move away from, or *repel*, each other. So, if a nucleus contains six protons, six electrons outside the nucleus will electronically balance the atom. Modern scientists have also discovered that when the nuclei of certain atoms are split, tremendous amounts of energy are released. The nuclei of uranium atoms, for example, can be split to provide energy for nuclear reactors and atomic bombs.