

## Waves and Work

As a wave travels, it does work on everything in its path. The waves in a pond do work on the water to make it move up and down. The waves also do work on anything floating on the water's surface. For example, boats and ducks bob up and down with waves. The fact that these objects move tells you that the waves are transferring energy.

## Energy Transfer Through a Medium

Most waves transfer energy by the vibration of particles in a medium. A **medium** is a substance through which a wave can travel. A medium can be a solid, a liquid, or a gas. The plural of *medium* is *media*.

When a particle vibrates (moves back and forth, as in **Figure 2**), it can pass its energy to a particle next to it. The second particle will vibrate like the first particle does. In this way, energy is transmitted through a medium.

Sound waves need a medium. Sound energy travels by the vibration of particles in liquids, solids, and gases. If there are no particles to vibrate, no sound is possible. If you put an alarm clock inside a jar and remove all the air from the jar to create a vacuum, you will not be able to hear the alarm.

Other waves that need a medium include ocean waves, which move through water, and waves that are carried on guitar and cello strings when they vibrate. Waves that need a medium are called *mechanical waves*. **Figure 3** shows the effect of a mechanical wave in Earth's crust: an earthquake.



**Figure 2** A vibration is one complete back-and-forth motion of an object.

**medium** a physical environment in which phenomena occur



**Figure 3** Earthquakes cause seismic waves to travel through Earth's crust. The energy they carry can be very destructive to anything on the ground.