Alternative Assessment

1. Design an experiment to compare the spring constant and period of oscillation of a system built with two (or more) springs connected in two ways: in series (attached end to end) and in parallel (one end of each spring anchored to a common point). If your teacher approves your plan, obtain the necessary equipment and perform the experiment.
2. The rule that the period of a pendulum is determined by its length is a good approximation for amplitudes below 15°. Design an experiment to investigate how amplitudes of oscillation greater than 15° affect the motion of a pendulum.

   List what equipment you would need, what measurements you would perform, what data you would record, and what you would calculate. If your teacher approves your plan, obtain the necessary equipment and perform the experiment.
3. Research earthquakes and different kinds of seismic waves. Create a presentation about earthquakes that includes answers to the following questions as well as additional information: Do earthquakes travel through oceans? What is transferred from place to place as seismic waves propagate? What determines their speed?
4. Identify examples of periodic motion in nature. Create a chart describing the objects involved, their path of motion, their periods, and the forces involved. Which of the periodic motions are harmonic and which are not?
5. Research the active noise reduction (ANR) technology used in noise-cancelling headphones. How does it work? What are some other applications that use ANR technology? Choose one application, and create a brochure to explain how it works.

Graphing Calculator Practice

Pendulum

Would a pendulum have the same period of oscillation on Mars, Venus, or Neptune? A pendulum's period, as you learned earlier in this chapter, is described by the following equation:

$$T = 2\pi\sqrt{\frac{L}{a_g}}$$

In this equation, T is the period, L is the length of the pendulum, and a_g is the free-fall acceleration (9.81 m/s^2 on Earth's surface). This equation can be rearranged to solve for L if T is known.

$$L = \frac{a_g T^2}{4\pi^2}$$

In this graphing calculator activity, you will enter the period of a pendulum on Earth's surface. The calculator will use the previous equation to determine L, the length of the pendulum. The calculator will then use this length to display a graph showing how the period of this pendulum changes as free-fall acceleration changes. You will use this graph to find the period of a pendulum on various planets.

Visit go.hrw.com and type in the keyword **HF6VIBX** to find this graphing calculator activity. Refer to **Appendix B** for instructions on downloading the program for this activity.