**Practice Problems Chapter 13 – back to Hooke’s Law**

1. A hand exerciser utilizes a coiled spring. A force of 89.0 N is required to compress the spring by 0.0191 m. Determine the force needed to compress the spring by 0.0508 m.

**Back to Conservation on Mechanical Energy**

1. An object of mass m = 0.200 kg is vibrating on a horizontal frictionless table. The spring has a spring constant k = 545 N/m. It is stretched initially to xo =4.50 cm and then released from rest. Determine the final translational speed vf of the object when the final displacement of the spring is **(a) xf = 2.25 cm** and **(b)** Xf = 0 cm.
2. An air-track cart attached to a spring completes one oscillation every 2.4 s. At t = 0 the cart is released from rest at a distance of 0.10 m from its equilibrium position. What is the position of the cart at **(a)**0.30 s, **(b)** 0.60 s, **(c)** 2.7 s, and **(d)** 3.0 s?
3. The air-track cart of the previous example is used for this example. What are the velocity and acceleration of the cart at **(a)** 0.30 s, **(b)**0.60 s?
4. A mass of 0.22 kg on an air-track cart is attached to a spring, it oscillates with a period of 0.84 s. What is the force constant for this spring?
5. When a 0.420 kg mass is attached to a spring, it oscillates with a period of 0.350 s. If, instead, a different mass,  m2, is attached to the same spring, it oscillates with a period of 0.700 s. Find (a) the force constant of the spring and (b) the mass m2
6. A 0.260 kg mass is attached to a vertical spring. When the mass is put into motion, its period is 1.12 s. How much does the mass stretch the spring when it is at rest in its equilibrium position?
7. The pendulum in a grandfather clock is designed to take one second to swing in each direction; that is, 2.00 seconds for a complete period. Find the length of a pendulum with a period of 2.00 seconds.
8. If you look carefully at a grandfather clock, you will notice that the weight at the bottom of the pendulum can be moved up or down by turning a small screw. Suppose you have a grandfather clock at home that runs slow. Should you turn the adjusting screw so as to **(a)** raise the weight or **(b)** lower the weight?
9. A pendulum is constructed from a string 0.627 m long attached to a mass of 0.250 kg. When set in motion, the pendulum completes one oscillation every 1.59 s. If the pendulum is held at rest and the string is cut, how long will it take for the mass to fall through a distance of 1.00 m?