1. (5 points) A mass hanging from a spring oscillates up and down with a frequency of 1.2 Hz and an amplitude of 2.0 cm.
   (A) The mass is 0.35 kg. What is the spring constant $k$?
   (B) What is the velocity of the mass as it passes through the equilibrium point?

2. The prong of a tuning fork moves back and forth when it is set into vibration. The distance the prong moves between its extreme positions is 2.50 mm, and the frequency of the tuning fork is 330.0 Hz (the E above middle C.)
   Assume that the prong moves with simple harmonic motion. (A) What is the maximum velocity of the tip of the prong? (B) What is the maximum acceleration of the tip of the prong?

3. An empty cart, tied between two ideal springs, oscillates with $\omega = 10.0$ rad/s. A load is placed in the cart, making the total mass 2.0 times what it was before. What is the new value of $\omega$?

4. A spring and mass oscillate back and forth on a frictionless surface, with an amplitude of 5.0 cm. The mass is 0.60 kg, and the spring constant is 30.0 N/m.
   (A) Find the total energy of the system.
   (B) Using conservation of energy, determine the velocity of the mass as it passes through the equilibrium point.
   (C) Find the angular velocity, $\omega$, of the system.
   (D) Find the maximum velocity of the mass, using $v_{\text{max}} = \omega A$. Compare this with your answer to (B).