

Acceleration and Velocity of a Spring

Solve the following problems

1. (Walker, p. 413, #30) A spring with a force constant of 65 N/m is attached to a 0.50-kg mass. Assuming that the amplitude of motion is 3.1 cm, determine the following quantities for this system: **(a)** v_{\max} , **(b)** T .

2. (Walker, p. 413, #32) A 85-kg mass attached to a vertical spring of force constant 150 N/m oscillates with a maximum speed of 0.35 m/s. Find the following quantities related to the motion of the mass: **(a)** the velocity when the spring is 3 cm from the equilibrium point, **(b)** the maximum magnitude of the acceleration.

3. (Giancoli, p. 342, #9) A 0.50 kg mass at the end of a spring vibrates 3.0 times per second with an amplitude of 0.15m. Determine the velocity when it passes the equilibrium point? What is the velocity when it is 0.10 m from the equilibrium? What is the acceleration at the points above?

4. (Giancoli, p. 343, #20) A 2.00 kg pumpkin oscillates from a vertically hanging light spring once every 0.55 s. It has a maximum amplitude of .2m. How long does it take to get to the equilibrium position the first time? What is its maximum speed? What will be the maximum acceleration? Where will it be attained? What is the velocity and the acceleration 0.15m above the equilibrium point? What about 0.15m below?

5. (Giancoli, p. 342, #16) A mass attached to the end of a spring is stretched a distance x_0 from the equilibrium and released. At what distance from the equilibrium will it have a velocity equal to half its maximum velocity? What distance will it have an acceleration equal to half its maximum acceleration?