

Name _____

Homework Questions

Simple Harmonic Motion #1

1. A 5.50 kg object is hung from the bottom end of a vertical spring fastened to an overhead beam. The object is set into vertical oscillations having a period of 2.40 s. Find the force constant of the spring.

N/m

2. A 1.00 kg object is attached to a horizontal spring. The spring is initially stretched by 0.400 m, and the object is released from rest there. It proceeds to move without friction. The next time the speed of the object is zero is 0.100 s later. What is the maximum speed of the object?

m/s

3. A 230 g block is attached to a horizontal spring and executes simple harmonic motion with a period of 0.100 s. If the total energy of the system is 1.00 J.

- a) Find the force constant of the spring

N/m

- b) Find the amplitude of the motion.

m

4. A 55.0 g object connected to a spring with a force constant of 35.0 N/m oscillates on a horizontal, frictionless surface with an amplitude of 8.00 cm.

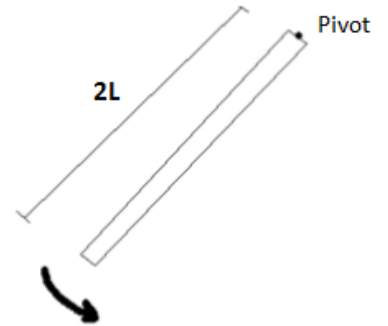
- a) Find the total energy of the system.

mJ

- b) Find the speed of the object when the position is 1.20 cm.

m/s

5. A bar of uniform mass M and length $2L$ is attached at its edge and allowed to oscillate as a pendulum. Solve for the period of this pendulum in terms of L and physical constants.



6. A 0.550 kg object attached to a spring with a force constant of 8.00 N/m vibrates in simple harmonic motion with an amplitude of 10.5 cm.

- a) Calculate the maximum value (magnitude) of its speed and acceleration.

cm/s

cm/s^2

- b) Calculate the speed and acceleration when the object is 6.50 cm from the equilibrium position. (Assume that when $t = 0$ s, the object is at the equilibrium position.)

cm/s

cm/s^2

- c) Calculate the time interval required for the object to move from $x = 0$ to $x = 3.50$ cm.

s