Physics C – More Harmonic Motion

Another way to look at SHM

x(t) =

A =

 =



v(t) =

a(t) =

Therefore

vmax = amax =

What kind of function follows this pattern:

second derivative + constant times function = 0?

Deriving formula for period

Energy

Assume no friction, so \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

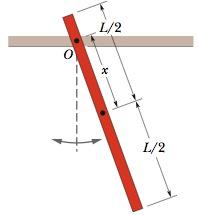
Kinetic Energy

Elastic Potential Energy

Total Energy

Physical Pendulum

An oscillating body that \_\_\_\_\_\_\_\_\_\_\_\_ according to the location of it \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_, (this means its mass is \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at the bottom like a \_\_\_\_\_\_\_\_\_\_\_ pendulum



Spring Example

A spring is hanging from the ceiling. You know that if you elongate the spring by 3.0 meters, it will take 330 N of force to hold it at that position: The spring is then hung and a 5.0-kg mass is attached. The system is allowed to reach equilibrium; then displaced an additional 1.5 meters and released. Calculate all of the following:

Spring constant Max velocity

Angular frequency Position of max velocity

Period Max Acceleration

Frequency Position of max acceleration

Total Energy

Simple Pendulum Example

A simple pendulum 4 m long swings with an amplitude of 0.20 m.

* 1. Compute the (i) period and (ii) frequency of that pendulum.

b. Compute the linear velocity of that pendulum at its lowest point.

Physical Pendulum Example

A thin uniform rod of length L and mass M is pivoted about an axis through the rod at a distance of L/4 from one end.

a. Find the moment of inertia of the rod in terms of M and L.

b. Find the period of oscillation of this rod in terms of M, L, and fundamental constants.

c. How would the period be affected if the mass of the rod is doubled without changing its length? Explain.

d. How would the period be affected if the length of the rod were doubled without changing its mass? Explain.