**Simple Harmonic Motion**

**Kinematics:**

  

ω – “Angular” velocity (rad/s)

T – Period of motion (s)

f – frequency (cycles/s or Hz)

x – Position (at some time) (m)

v – Velocity (at some time) (m/s)

t – elapsed time (s)

xo – Max Position (Amplitude) (m)

 

 

Kinematics Example: **(Are you in RADIANS????)**

A SHO goes up and down, and has a period of 12 seconds, and an amplitude of 5.0 m. If it starts in the middle going upward, write an equation of its motion:

a) What is its position and acceleration in 6.5 seconds?

b) What is its velocity in 6.5 seconds?

c) What times will it be at the top?

d) When will it be at the bottom?

e) What is its speed and acceleration when it is at a position of 1.75 m?

**Energy:**

ET – Total energy (Ek + Ep)

Ek – Kinetic Energy

Ep – Potential Energy

ω – “Angular” velocity (rad/s)

x – Position (at some time) (m)

xo – Max Position (Amplitude) (m)

v – Velocity (at some time) (m/s)

 

  

Energy Example – An SHO has an amplitude of 0.480 m, a mass of 1.12 kg, and a period of 0.860 seconds.

a) What is its angular velocity?

b) What is its total energy? What is the maximum kinetic energy and maximum potential energy?

c) What is the kinetic and potential energy when the velocity is 3.00 m/s?

d) What is the kinetic energy when it is 0.230 m from equilibrium? What is its potential energy here?

e) Write possible equations for its position and velocity: