

# Help Session 8-( Fuad Enaya)

3/1/2005

## CH #16

- 1- A simple pendulum has a period of 3.0 s on the earth. What would its period be on the moon where  $g(\text{moon}) = 1.67 \text{ m/s}^2$  ? [**7.3 s**]
- 2- An oscillatory mass-spring system has a total mechanical energy of 1J, an amplitude of 10 cm and a maximum speed of 1 m/s. Neglecting friction, what is the mass ? [**2 kg**]
- 3- A 5-kg mass attached to a spring executes a simple harmonic motion with a period of 2.0 s. If the total energy of the system is 10 J, the amplitude of oscillation (in m) is: [**0.637**]
- 4- A 0.4-kg mass attached to a spring of force constant 40 N/m vibrates with a simple harmonic motion of amplitude 10 cm. Calculate the shortest time that is taken by the mass to move from  $x = 0$  to  $x = 10 \text{ cm}$ . [**0.157 s**]
- 5- A mass of 1.0 kg connected to a light spring of force constant 30 N/m oscillates on a horizontal frictionless surface with magnitude 3 cm. Find the kinetic energy of the system when the displacement equals 2 cm. [ **$7.5 \times 10^{-3} \text{ J}$** ]
- 6- A simple pendulum has a length of 3.00 m. Determine the change in its period if it is taken from a point where  $g=9.80 \text{ m/s}^2$  to a higher elevation, where the acceleration due to gravity  $g=9.75 \text{ m/s}^2$ . [**increases by 8.9 ms**]
- 7- A 200 g mass is attached to a spring and executes simple harmonic motion with a period of 0.25 s. If the total energy of the system is 2 J, Find the amplitude of motion. [**18 cm**]
- 8- If the amplitude of a system moving with simple harmonic motion is doubled, the total energy will be: [**4 times larger**]

9- A particle at the end of a spring executes simple harmonic motion with an amplitude of 4.0 cm. At what displacement ( $x$ ) will its speed be equal to one half its maximum speed? [**3.46 cm**]

10- A particle of mass  $m=0.14$  kg at the end of a spring executes a simple harmonic motion according to the equation:  $x=0.2 \cos(10t + \pi/2)$  Find the maximum potential energy of the spring.? [**0.28 J**]

11- At a certain instant, the displacement of a particle executing simple harmonic motion is 2.0 m, and its acceleration is  $-6.0 \text{ m/s}^2$ . Find its frequency of oscillation. [**0.28 Hz**]

12- A simple pendulum of length 1.30 m makes 50.0 complete oscillations in 100 seconds on a certain planet. Find the acceleration due to gravity on this planet. [**12.8 m/s<sup>2</sup>**]

13- A 0.5-kg box, connected to a light spring of force constant 20 N/m, oscillates on a horizontal frictionless surface. The amplitude of the motion is 3.0 cm. Find the speed of the box when its displacement  $x = 2.6$  cm. [**0.09 m/s**]

14- A 3-kg block, attached to a spring, executes simple harmonic motion on a horizontal frictionless surface according to  $x = 2 \cos(50 t + 3.14)$  where  $x$  is in meters and  $t$  is in seconds. Find the value of the spring constant. [**7500 N/m**]

***With My Best Wishes***

***Fuad***