Practice Worksheet

- 1. (momentum review) A 0.01 kg bullet moving horizontally at 200 m/s crashes into a stationary 2.99 kg block on a level, horizontal surface.
 - a. What is the speed of the bullet/block combination after the perfectly inelastic collision?
 - b. How much energy was lost in the collision?
 - c. How high would the bullet/block combination slide up a 36.87° hill after the collision?
- 2. (momentum review) A 4 kg block moving at 20 m/s collides elastically, head-on with an initially stationary 6 kg block. What are the speeds and directions of motion of the two blocks after the collision?
- 3. The frequency of an oscillator is 2 HZ. What is its period? What is its frequency in rpm? What is the average speed of the oscillator if its amplitude is 20 cm?
- 4. At what point in an oscillation cycle (middle, end, in between) are the following quantities at a maximum? Minimum?
 - a. Speed
 - b. Net Force
 - c. Potential Energy
 - d. Kinetic Energy
 - e. Acceleration
- 5. A 2 kg mass and a 50 N/m spring comprise a horizontal spring-mass oscillator on a frictionless surface. If the amplitude of the oscillator is 40 cm,
 - a. What is the maximum force on the mass?
 - b. What is the maximum potential energy of the spring?
 - c. What is the maximum acceleration of the mass?
 - d. What is the minimum acceleration of the mass?
 - e. Using conservation of energy, calculate the maximum speed of the mass.

Selected answers...

1.a. 0.667 m/s 1.c. 37 cm = .037 m

2. v(4) = -4 m/s, v(6) = +16 m/s

3.a. $\frac{1}{2}$ second b. 120 rpm c. (this is tricky!!) 160 cm/sec (its average velolcity = 0 m/s, though)

4. maximums: a. middle b. ends c. ends d. middle e. ends (why?)

5. a. 20 N b. 4 J c. 10 m/s^2 d. 0 m/s^2 e. 2 m/s