University of Mississippi Name: _____
PHYS 213 Sec 4, 14 Oct 2005

Test 2

Instructions:
Answer all of the following questions. You may use a calculator, but no book or notes. You may add more sheets if needed. Keep in mind: *What you write should be a readable, understandable explanation of how you arrive at each answer*. This means: Write clear, well organized answers; Explain all your answers and the main steps of the calculations; Don't include non-relevant equations and calculations.

1. We have talked about centripetal force in circular motion, but we mentioned "centrifugal force" only briefly. Are they the same thing? If not, why did we only talk about one of them? (10 pts.)

2. Suppose you drop a ball from a tall building, and air resistance can be neglected, so the only force acting on it as it falls is gravity; you observe that the ball bounces back, but to a lower height than you dropped it from. Does this mean that energy was conserved? If yes, explain why it was conserved, if not, explain where the energy went. (10 pts.)

3. If the energy of an object is conserved, is its momentum also conserved? If yes, explain why; if not, give an example. (10 pts.)

4. If the total momentum of two particles is conserved, is their energy also conserved? If yes, explain why; if not, give an example. (10 pts.)

5. A 0.120-kg ball is tied to a string. The string is held by a person who revolves it in a horizontal circle of radius 0.600 m, and the ball makes 2.50 revolutions per second. Because of the ball's weight, the circle is a bit lower than the person's hand.

(a) Sketch the situation, draw a free-body diagram, and calculate the ball's acceleration. (10 pts.)

(b) Find the magnitude of the string tension and the angle the string makes with the horizontal. (10 pts.)

6. A 64.0-kg bungee jumper jumps from a bridge, and is tied to a cord of unstretched length 11.5 m that behaves like a spring when stretched. The jumper falls a total of 32.0 m before bouncing back.

(a) What is the effective spring stiffness constant of the bungee cord? (10 pts.)

(b) What is the acceleration of the jumper at the bottom of the fall, just before bouncing back up? (10 pts.)

7. A skier throws a 1.0-kg ski up a 22º slope giving it an initial speed of 21 m/s.

(a) If you could neglect friction with the snow, what distance would the ski slide up the hill? (Solve the problem using conservation of energy.) (10 pts.)

(b) If the ski slides only 75% of the distance in part (a), how much work was done by the force of sliding friction? (10 pts.)