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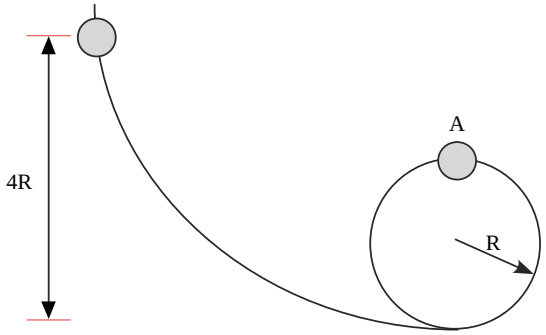
Name: _____

Physics 2A
Winter 2010
Exam 3

MAKE SURE TO SHOW ALL WORK IN COMPLETE DETAIL! NO CREDIT WILL BE GIVEN IF NO WORK IS SHOWN! EXPRESS ALL ANSWERS IN SI UNITS.

1. A bead slides without friction around a loop-the-loop as shown below. The bead is released from rest from a height of 4R. (10 pts)



a. What is the speed at point A?
b. Calculate the normal force on the bead at point A if its mass is 10.0g.

2. A 200 g block is pressed against a spring (K = 1400 N/m) until the block compresses the spring 10.0 cm from equilibrium. The spring rests at the bottom of a frictionless incline plane of angle 60^0. The block is released from rest. (10 pts)
   a) Calculate the speed of the block when it passes through the equilibrium position of spring.
   b) Calculate the maximum distance it moves up the incline plane.

3. A 20 kg block initially moving at 2.0 m/s collides with a 12 kg block initially at rest. After the collision the 20 kg block is moving at 1.0 m/s in a direction of 30^{o} with its initial direction. (Assume frictionless surface) (10 pts)
    a) Calculate the magnitude and direction of the velocity of the 12 kg block after the collision.
    b) Determine if the collision is elastic or inelastic.

4. In the figure below the 5.0 kg block is moving on a frictionless surface toward a 2.0 kg block initially at rest and connected to a spring. (15 pts)

   a) Calculate the maximum compression of spring after the collision.
   b) Calculate how much energy is lost during the collision

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