DO NOT TURN THIS PAGE!!!!!

Name: _____

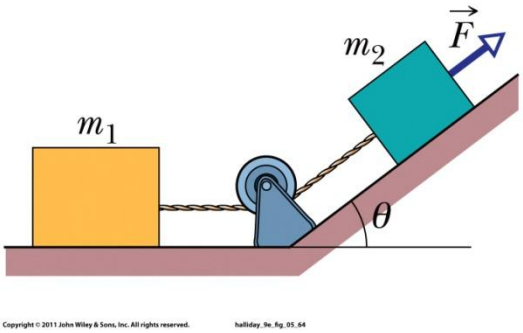
Physics 50
Spring 2013
Exam 2

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. In a friendly game of handball, you hit the ball essentially at ground level and send it toward a wall 4.6 m away. The ball is hit with a speed of 20 m/s at 40^{o} above the horizontal. (10 pts)

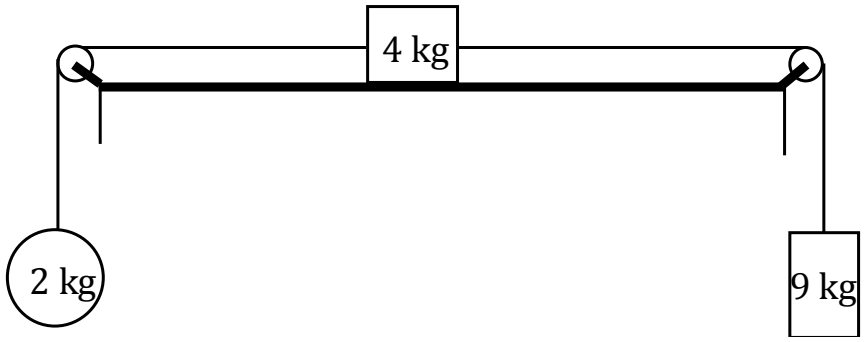
   a) At what height does the ball strike the wall?
   b) Calculate the speed of ball at impact.
   c) Is the ball moving upward or downward at impact? Explain.

2. Find the tension in the rope if F = 12 N, m_1 = 3.0 kg, m_2 = 1.0 kg, and θ = 37. Take all contact surfaces to be frictionless. (10 pts)



halliday_9e_fig_05_64

3. Find the acceleration of the blocks. Assume ideal rope, ideal pulley, and frictionless surface. (10 pts)



4. A clock has a 20 cm second hand. From the 12 PM mark to the 3 PM mark, for the ***tip of the second*** hand, calculate the: (15 pts)

    a. Displacement vector in unit-vector notation.
    b. Average velocity vector in unit-vector notation.
    c. Average acceleration vector in unit-vector notation.
    d. Calculate the magnitude and direction of $\mathbf{a}_{\mathbf{ave}}$.
    e. Calculate the magnitude and direction of the instantaneous acceleration vector at the 3 PM mark.

Use a coordinate system with the origin at center of the clock with the +x axis along the 3 PM mark and the +y axis along the 12 PM mark. Express your answers in cm,s units.