# DO NOT TURN THIS PAGE!!!!!

Name: _____

Physics 2A
Spring 2014
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. Short-answer questions: (2 pts each)

   a) What is an inertial reference frame?

   b) Which frictional force involves relative motion between the contact surfaces?

   c) List two differences between mass and weight.

   d) Why is N1L called the *law of inertia*?

   e) A ball is given an initial velocity of 5 m/s upward continues to move upward. Is there a force acting on ball that keeps it moving upward?

2. Find the tension in the rope if F = 30 N, m_1 = 3.0 kg, m_2 = 2.0 kg, and θ = 37. Take all contact surfaces to be frictionless. (10 pts)
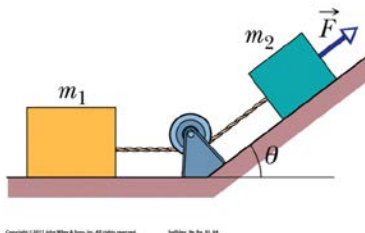
3. A force of magnitude 120 N is exerted on the 4 kg mass as shown below.
   (10 pts)
   a) Calculate the acceleration of the masses.
   b) Calculate the tension in each string.

F = 120 N

M_1 4 kg

M_2 2 kg

M_3 3 kg
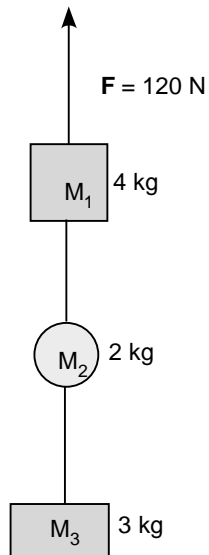
4. To move a large crate across a rough floor, you push on it with a force **F** at an angle of 40° below the horizontal as shown below. Find the force required to start moving the crate given that the mass of the crate is 45 kg and the coefficient of static friction is 0.83. (10 pts)

40°

F

45 kg
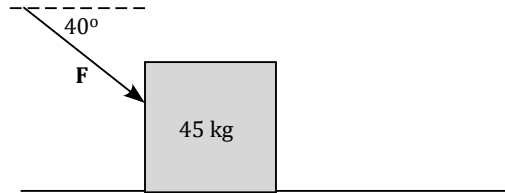
5. The motorcyclist is moving at a constant speed of 28.5 m/s in a track as shown below. (10 pts)
   a) Calculate the normal force exerted on the motorcycle at point A, B, and C if r = 8 m and the combined mass of the motorcycle and person is 150 kg.
   b) Calculate the minimum speed the motorcycle should have at the top of the track in order to make a complete loop.