PHYS 203A – Final Homework Assignment **Name:**

***Due Date:* Wed. May 10th, 7:50 AM (FINAL TIME)**

TO GET FULL CREDIT YOU MUST:

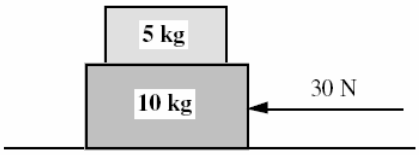
1. ***SHOW ALL YOUR WORK***
2. ***Write the solution clearly so WE MAY READ IT THROUGH!***

Failure to comply with any of the above guidelines WILL hurt your score

1. A 10 -kg object moves in the eastward direction at constant speed of 2 m/s. A 10-N force directed northward acts on the object for 5 seconds. Find the magnitude and direction (with respect to the East direction) of the object's displacement at the end of the 5-second period.

2. Two blocks rest on a horizontal frictionless surface as shown. The surface between the top and bottom blocks is roughened so that there is no slipping between the two blocks. A 30-N force is applied to the bottom block as suggested in the figure.

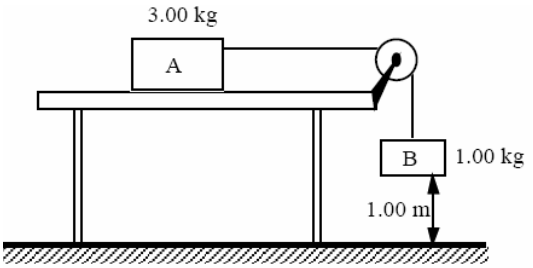
a). What is the acceleration of the "two block" system?



b). What is the force of static friction between the top and bottom blocks?

c). What is the minimum coefficient of static friction necessary to keep the top block from slipping on the bottom block?

3. Two boxes are connected to each other as shown. The system is released from rest and the 1.00-kg box falls through a distance of 1.00 m. The surface of the table is frictionless. What is the kinetic energy of box B just before it reaches the floor? ***HINT****: Use the conservation of total energy* E_A+E_B *and the fact that both boxes move together with the same speed.*



4. An automobile approaches a barrier at a speed of 20 m/s along a level road. The driver locks the brakes at a distance of 50 m from the barrier. What minimum coefficient of kinetic friction is required to stop the automobile before it hits the barrier?HINT: Use Work-Energy theorem

5. Consider the following four objects: a hoop, a solid sphere, a hollow sphere, a flat disk. Each of the objects has mass M and radius R. The axis of rotation passes through the center of each object, and is perpendicular to the plane of the hoop and the plane of the flat disk. Which object requires the largest torque to give it the same angular acceleration? ***Justify your answer and rank the objects starting with the one that requires the largest torque****.*

6. A spring with constant k = 40.0 N/m is at the base of a frictionless, 30.0°-inclined plane. A 0.50-kg block is pressed against the spring, compressing it 0.20 m from its equilibrium position. The block is then released. If the block is not attached to the spring, how far ***along the incline*** *will it travel before it stops?*