CSUC Fall Term 2006 Physics 204A sections 5 and 6

Second Exam Friday, October 13

Please complete the following problems on the blank sheets provided using one side only. Show all your work clearly and don't dwell too long on any one problem. Rather, complete first those that you understand better and return to any remaining problems at the end. Each problem is worth 20 points. Be sure to work from fundamental equations only and indicate your derivations. When you are done please sign each sheet and number them, then staple them together and place them in the box provided.

No calculators and no notes of any kind are to be used. Please complete all your reasoning symbolically and express your solution as an algebraic expression into which you then substitute the appropriate numerical values. You need not evaluate this last numerical expression explicitly.

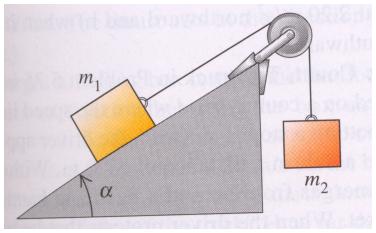
1) **a)** State Newton's laws clearly (in words and/or symbols) and in order.

2) A block of mass m_1 is placed on an inclined plane with slope angle α and is connected to a second hanging block m_2 by means of an ideal string and pulley as shown. The coefficient of kinetic friction is is μ_k . Draw free body diagrams and:
a) Find the mass m_2 such that m_1 moves up the plane at constant velocity once in motion.
b) Now find the mass m_2 such that m_1 moves down the plane at constant velocity once in motion.

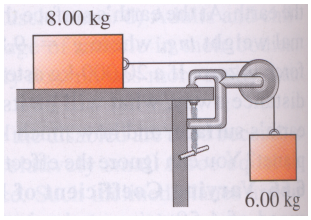
3) **BANKED CURVE:** A curve with a 120-m radius on a level road is banked at the correct angle for a speed of 20 m/s (i.e. a car with no frictional help would just make this curve at 20 m/s without skidding). If a car rounds this curve at 30 m/s, what is the minimum coefficient of static friction needed between tires and road to prevent skidding?

2) The tension at which a fishing line snaps is commonly called its strength.
a)What minimum strength is needed for a line that is to stop a 19 pound salmon in 4.4 inches if the fish is initially drifting at 9.2ft/sec ? (assume a constant deceleration)
b) How long will it take to stop the fish?

5) Two blocks are connected by an ideal string that runs over an ideal frictionless pulley as shown below. The coefficient of kinetic friction between the 8-kg block and the table top is $\mu_k = 0.25$. If the blocks are released from rest:
a) Use *energy methods* to find the speed of the 6-kg block after it has descended 1.5 m .
EXTRA CREDIT
b) Use your result from **a)** to find the *acceleration* of the system and then
c) find the string *tension* by using the results of **a)** and **b)** .



2)



5)