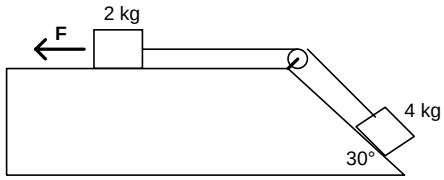
Name:_____ Date:_____

Mr. Croom's Physics Chapter 4: Force and the Law of Motion

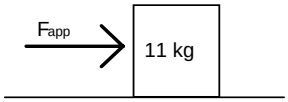
Advanced Friction

Solve the following problems

1. Calculate the force that is needed to accelerate the system at 4 m/s^2 to the left. What is the resulting tension in the string? The coefficient of kinetic friction is equal to 0.1.



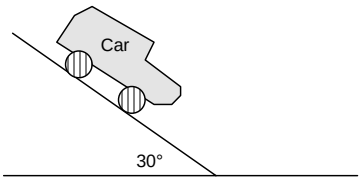
2. Calculate the following for the situation below, if μ_s = 0.7and μ_k = 0.4.



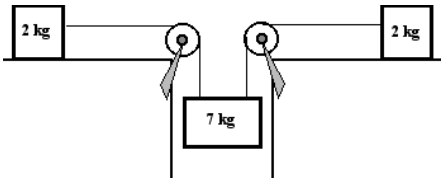
   a. The force required to get the block moving?
   b. The force required to keep the block moving at a constant rate?
   c. The acceleration of the object if the applied force (F_{app}) = 80 N.
   d. The acceleration of the object if the applied force is = 125 N.
   e. The velocity of the object after 2 seconds at the acceleration of part (c), assuming it started at rest.
   f. The time it would take to come to a complete stop if F_{app} goes to zero after these 2 seconds.

3. (walker, p. 166, #7) (Look back at applied forces 1, Problem 1) To move a large crate across a rough floor, you push down on it at an angle of 21°, as shown in Figure 6-16. Find the force necessary to start the crate moving, given that the mass of the crate is *m* = 30 kg and the coefficient of static friction between the crate and the floor is μ_S= 0.52.

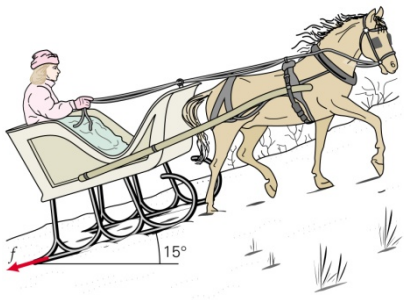
4. Bob takes a drive into the city to visit the bank to take out money. The bank is located on a hill, and he parks his 20,000 N station wagon on a section of the street that is at a 30º to the horizontal.
   a. What is the value of the normal force on the car?
   b. What is the value of the frictional force on the car?
   c. What is the coefficient of friction?



5. What coefficient of frictions will both of these identical boxes in the picture below need to prevent the 7kg box from moving?



6. A 350 kg horse pulls a 180 kg sled up a 15° incline. If the coefficient of friction is 0.2 for the sled and 0.4 for the horse, how much force must the horses legs pull with to move the sled up the hill?



7. If a block on an incline starts to slide when the angle of the incline is at 37°, what is the coefficient of static friction? Show how you derived your answer.