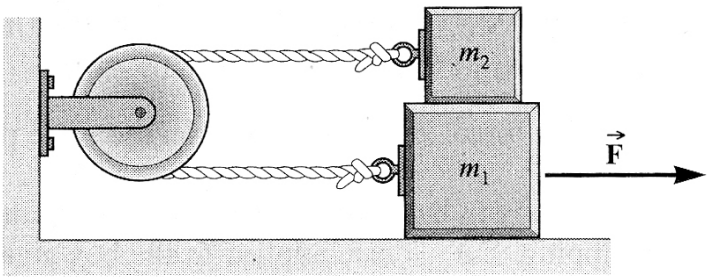
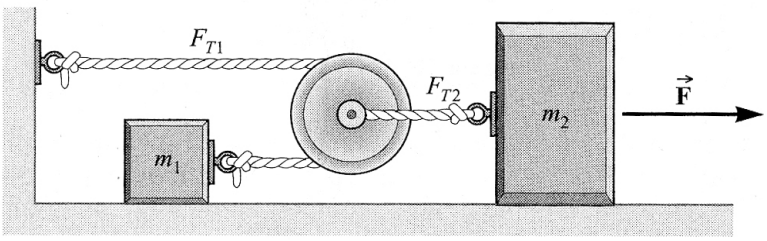
AP Physics

Worksheet 02a – Forces and Friction

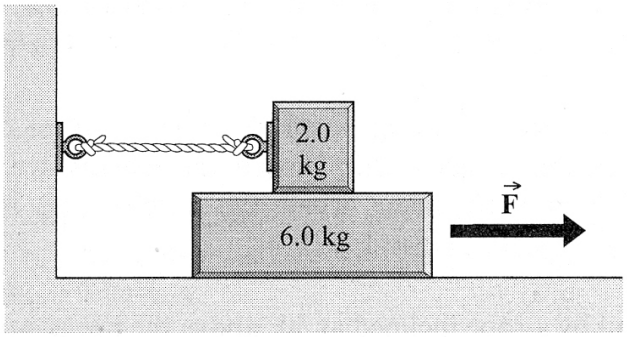
In the system shown below, a force F accelerates block m_1 to the right. The pulley and rope are ideal. Find the acceleration of block m_1 in terms of F and the coefficient of friction μ_k at the contact surfaces.



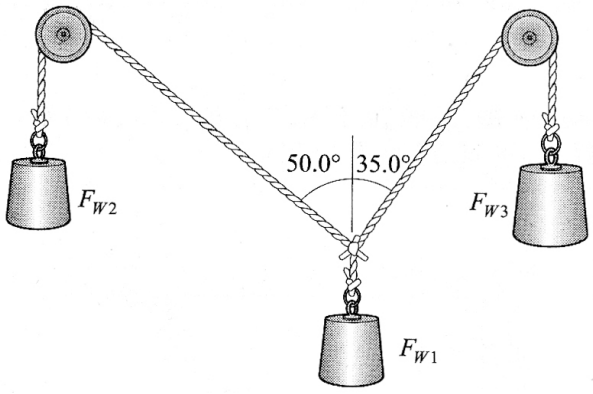
In the system shown below, friction and the masses of the pulley and rope are negligible. Find the acceleration of m_2 if m_1 = 300 g, m_2 = 500 g and F = 1.5 N. Solve this symbolically first.



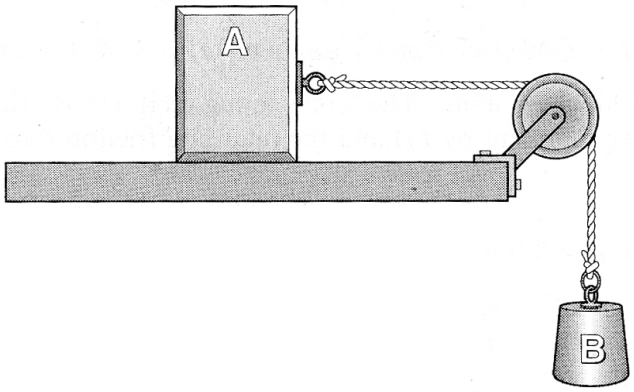
In the system shown below, μ_k at all surfaces is 0.40. How large a force F is required to pull out the 6.0 kg block with an acceleration of 1.5 m/s?



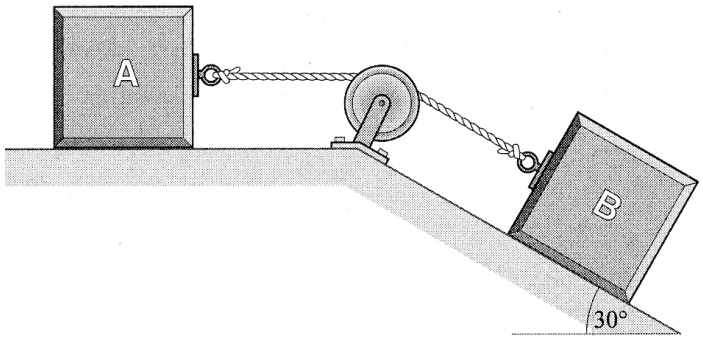
In the equilibrium configuration below, the weight of the middle block F_{w1} is 500 N. Find the values of F_{w2} and F_{w3}. The pulleys and ropes are ideal, of course.



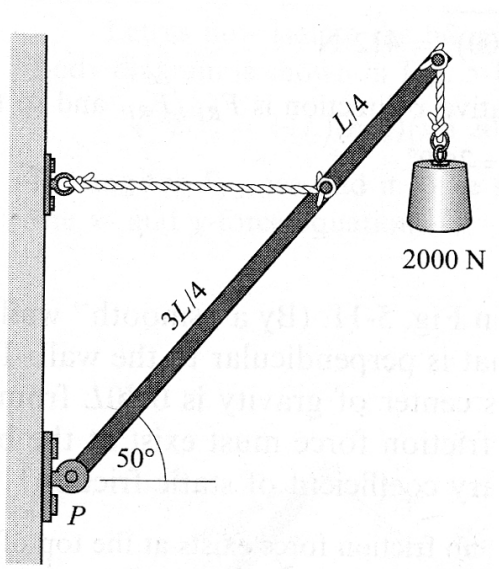
The coefficient of kinetic friction between block A and the table is 0.20. m_A = 25 kg and m_B = 15 kg. The pulley and rope are magical, so they are massless and ideal. How far will mass B drop in the first 3.0 seconds after the system is released?



Both boxes, A and B have identical masses of 40 kg. Both experience a sliding friction force with μ_k = 0.15. Of course, the pulley and rope are ideal. What is the acceleration of the boxes and the tension in the cord?



A boom with a body weight of 400 N from a uniformly distributed mass is supporting a 2000 N weight as shown below. Find the tension in the tie rope and the force exerted on the boom by the pin at point *P*.



A 900 N roller is to be pulled over a 5.0 cm high obstruction, as shown below. The radius of the roller is 25 cm. What minimum force F is required if the angle θ made by the handle is (a) 0^o and (b) 30^o?