Name_____

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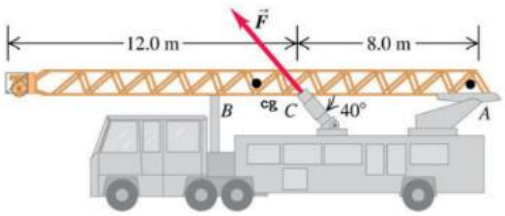
UNIT II: Worksheet 1

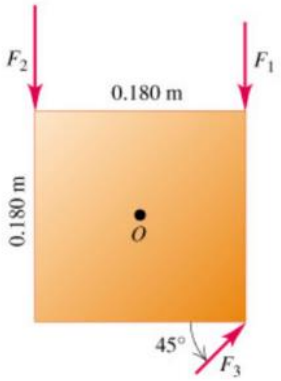
1. Block A weighs 1.20 N and block B weighs 3.60 N. Block A rests atop block B. The coefficient of kinetic friction between all surfaces is 0.300. Find the magnitude of the horizontal force $\vec{F}$ necessary to drag block B to the left at a constant speed…
   a. if A rests on B and moves with it

   b. if A is held at rest by a cord fixed to a wall

2. A ladder carried by a fire truck is 20.0 m long. The ladder weighs 2800 N and its center of gravity is at its center. The ladder is pivoted at one end (***A***) about a pin; you can ignore the friction torque at the pin. The ladder is raised into position by a force applied by a hydraulic piston at ***C***. Point ***C*** is 8.0 m from ***A***, and the force $\vec{F}$ exerted by the piston makes an angle of 40^0 with the ladder. What magnitude must $\vec{F}$ have to just lift the ladder off the support bracket at ***B***?

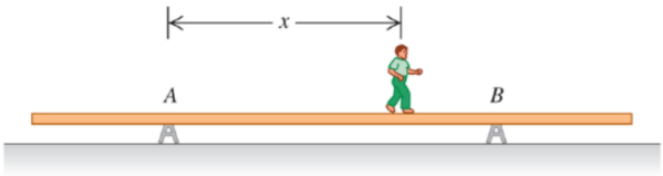


3. A square metal plate 0.180 m on each side is pivoted about an axis through point O at its center and perpendicular to the plate. Calculate the net torque about this axis due to the three forces if the magnitudes are F_1 = 18.0 N, F_2 = 26.0 N, and F_3 = 14.0 N. The plate and all forces are in the plane of the page. F_3 is at 45^0.



4. Two 25.0 N weights are suspended at opposite ends of a rope that passes over a light, frictionless pulley. The pulley is attached to a chain that goes to the ceiling.
   a. What is the tension in the rope?

   b. What is the tension in the chain?



5. A uniform, aluminum beam 9.00 m long, weighing 300 N, rests symmetrically on two supports 5.00 m apart. A boy weighing 600 N starts at point A and walks toward the right.
   a. In the same diagram construct two graphs showing the upward forces F_A and F_B exerted on the beam at points *A* and *B*, as functions of the coordinate x of the boy.

   b. From your diagram, how far beyond point B can the boy walk before the beam tips?