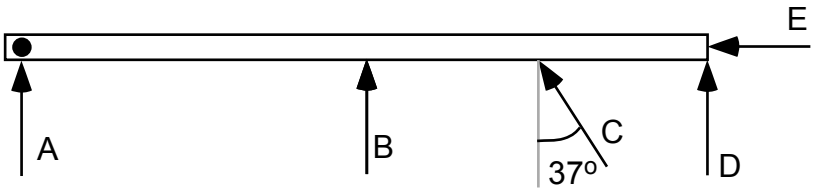
Easier Problems

1. A 5N force is applied perpendicular to a stick 0.30m from the axis of rotation, what torque does it exert?

Problems 2-5 refer to the same stick illustrated below #2.

2. Five 10 N forces are shown below acting on a meter stick. Determine the torque exerted by each force. A is applied 0 cm from the pivot, B is 50 cm, C is 75 cm, D and E are both 100 cm from the pivot. (There is no effect due to gravity here).

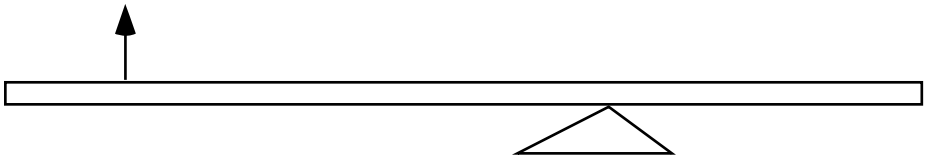


3. What is the net torque on the stick?

4. If the stick has a moment of inertia of 0.0167, what is the angular acceleration of the stick?

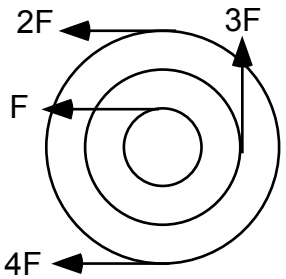
5. A force is applied to the stick 60 cm from the pivot. If the force is applied 30° from the perpendicular, how large and in what direction must the force act to prevent the stick from turning?

6. A 10 kg board is positioned as shown below. How strong would the string have to be in order to prevent the board from turning (find the tension in the string)? The string is placed at 1/10th the length of the board from the left end, the center of mass is in the center of the board, and the pivot is placed 6/10ths from the left end.



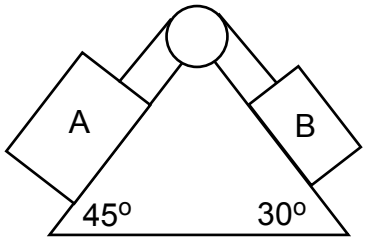
7. If the string in #6 is cut and the initial angular acceleration of the board is 0.02 radians per second^2, what is the moment of inertia of the board?

8. Three concentric wheels have radii, R, 2R, and 3R. The wheels are constrained to turn together. Forces are applied as shown below. What is the net torque acting on the object?



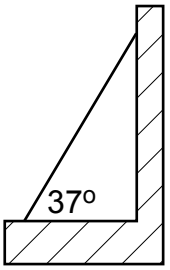
More Interesting Problems

1. Two blocks are placed on a table connected by a string that passes over a pulley whose moment of inertia is 0.05 kgm^2. Block A has a mass of 4 kg and block B has a mass of 2 kg. The the radius of the pulley is 0.04 m.



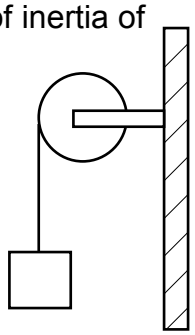
   a. Draw FBDs.
   b. Set up equations for A, B, and the pulley.
   c. Find the acceleration of the blocks.
   d. Find the angular acceleration of the pulley.
   e. Find the tension in the left rope.
   f. Find the tension in the right rope.

2. A board leans against a wall as shown below. The board has uniform density, a length L, and a mass M. The wall is frictionless, but the floor isn't.



   a. Draw a FBD.
   b. If the floor is the pivot which forces exert torques?
   c. Write equations for the net forces and net torques.
   d. Determine the force due friction from the floor needed to keep it from sliding in terms of M, L, g, and constants.

3. A string is wound around a pulley of radius 0.2 m. The pulley has a moment of inertia of 0.05 kgm^2. A 0.5 kg block is attached to the end of the string. Determine:



   a. The tension in the string.
   b. The acceleration of the block.
   c. The angular acceleration of the pulley

4. A ball of mass M and radius R, whose moment of inertia is I, rolls down a plane inclined at an angle of θ. The force of friction is enough to prevent sliding such that the ball only rolls and has a value, F. Determine the acceleration of the ball in terms of M, R, g, I, θ, F and constants.