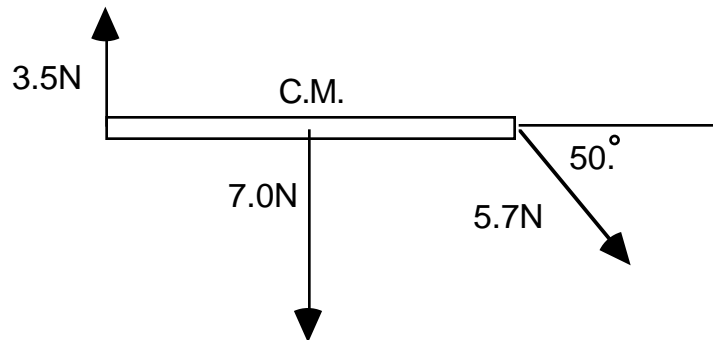


Equilibrium : W.S.-25

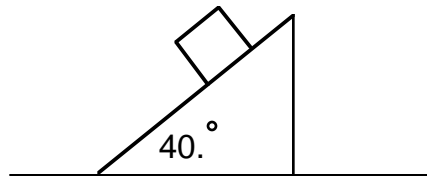
- 1) Give the two conditions for a body to be at equilibrium.

- 2) Three forces act on a body. They are: $[12,7]\text{N}$, $[-3,-10]\text{N}$, and $[-5,6]\text{N}$.
 - a) The net force is _____ .
 - b) A fourth force is applied to the body so that it is at equilibrium. The fourth force is _____ .

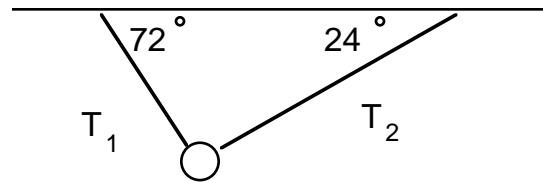
- 3) The 3.0 meter long bar is not at equilibrium.
 - a) Find the torque about the center of mass.
 - b) Find the net force.



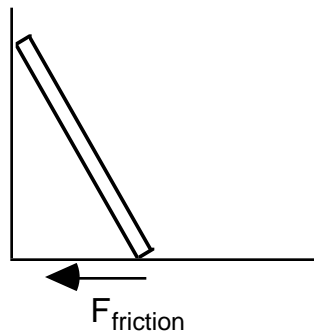
- 4) The block is at equilibrium. It has a mass of 18kg. Draw the free body diagram. Find the force of friction and the normal force.



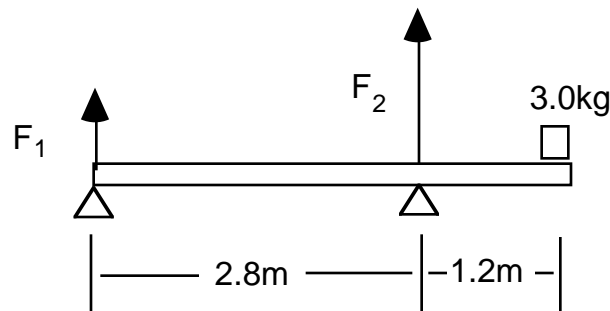
5) The weight of the ball is 75N. Find the tensions in the two wires.



6) A 9.0 kg ladder leans against a frictionless wall. The angle between the ladder and the floor is 82 degrees. Find the force of friction acting on the bottom of the ladder. (Hint: take torques about the foot of the ladder)



7) The 12kg bar is at equilibrium. Find F_1 and F_2 .



Answers: 1) Σ Forces = 0, Σ Torques = 0, 2)a) [4,3] N, b) [-4,-3] N, 3) -12Nm, $F_{net} = [3.7, -7.9]$ N, 4) $F_{friction} = 110$ N, $F_{Normal} = 140$ N, 5) $T_1 = 69$ N, $T_2 = 23$ N, 6) $F_{Friction} = -6.2$ N, 7) $F_1 = 21$ N, $F_2 = 130$ N.