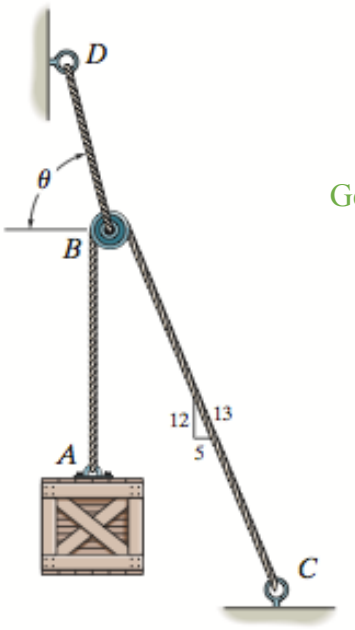
TAM 210/211 Written Assignment 2 (due Friday, Sep 28th)

The **OBJECTIVE** of this written assignment is to practice **drawing free-body diagram (FBD)** and **writing equations of equilibrium (EoE)**.

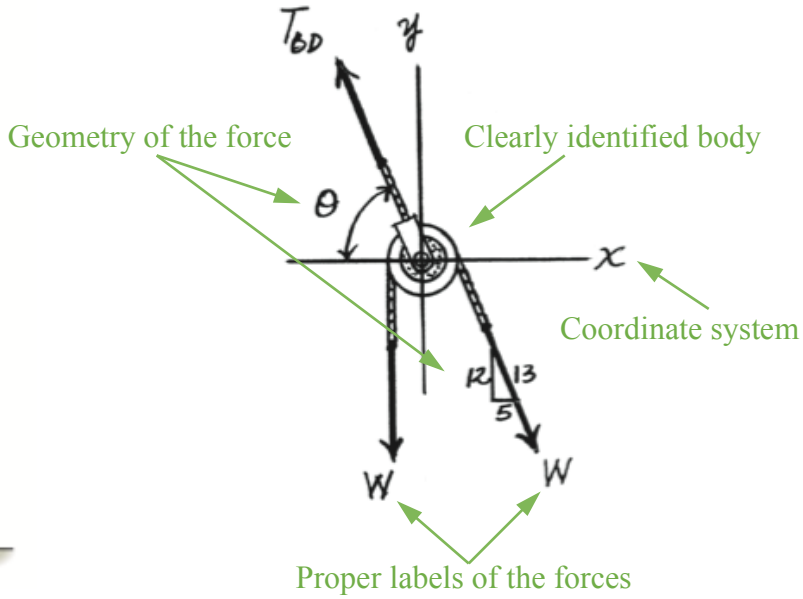
DIRECTION: Draw the proper free body diagram(s) for the body (bodies) specified in each problem and write the corresponding equations of equilibrium for each diagram. DO NOT SOLVE THE PROBLEM.

General "Written Assignment Instructions" applies. Additional grading criteria includes: 1) Clearly identified body of interest; 2) properly labeled external forces on the body; 3) geometry of the forces; 4) coordinate system; 5) variables in EoE correspond to FBD.

Sample Problem: The cord *BD* can support a maximum load of *T*. Perform equilibrium analysis on pulley *B* for determining the maximum weight of the crate, and the angle θ for equilibrium. Assume the mass of the pulley is negligible.



Sample FBD Solution

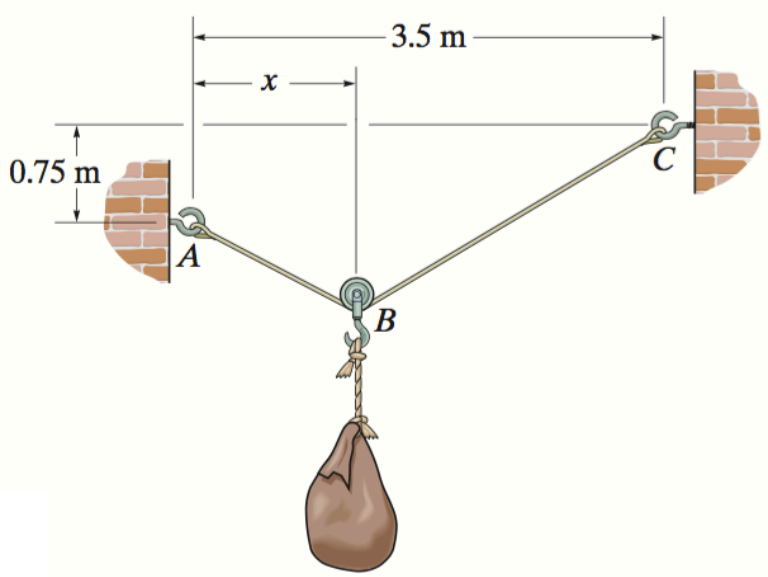


Sample EoE Solution

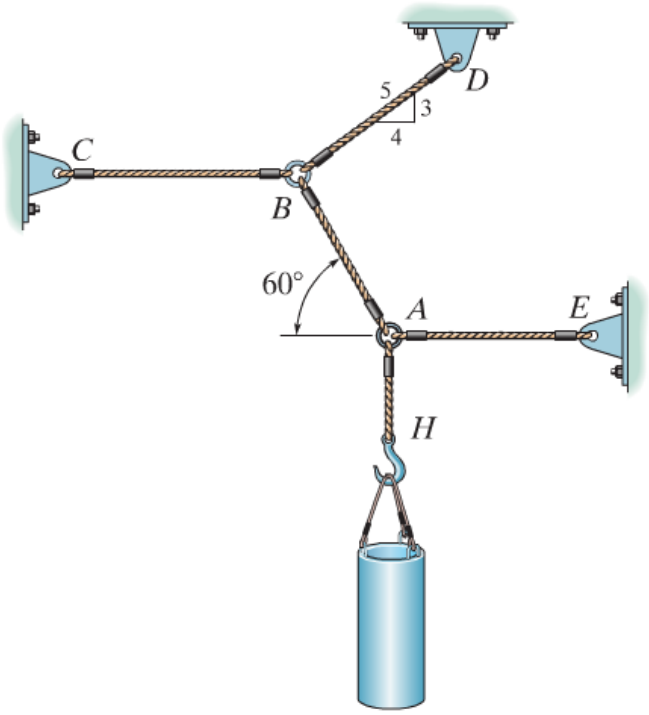
$$\sum F_x = 0 = -T_{BDx} + W_x = -T_{BD}(\cos\theta) + W\left(\frac{5}{13}\right) = 0$$

$$\sum F_y = 0 = T_{BDy} - W - W_y = T_{BD}(\sin\theta) - W - W\left(\frac{12}{13}\right) = 0$$

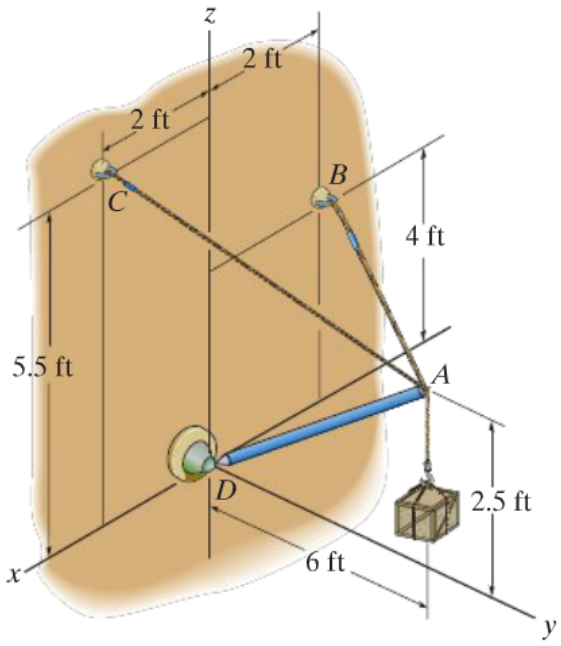
Problems 1: A money sack with mass *m* is to be supported by the rope-and-pulley arrangement shown. Perform equilibrium analysis on the pulley to determine the distance *x* required for the sack to maintain equilibrium. Assume the mass of the pulley is negligible.



Problem 2: The weight of the cylinder is *W*. Perform equilibrium analysis on: a) ring *A*; and b) ring *A*-cord *AB*-ring *B* system to determine the tension in the cords *AE* and *BD*.



Problem 3: Given the mass of the crate is m, perform equilibrium analysis on point A to determine the tension developed in the cables AB.



Problem 4: A traffic light with weight W is supported by three cables as shown. Perform equilibrium analysis on point A to determine the tension in each wire. Include the unit vectors what give the directions of the forces acting on point A.