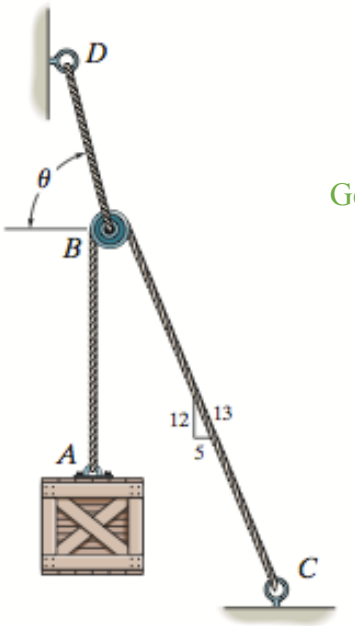
TAM 210/211 Written Assignment 4 (due Thursday, Mar 29th)

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

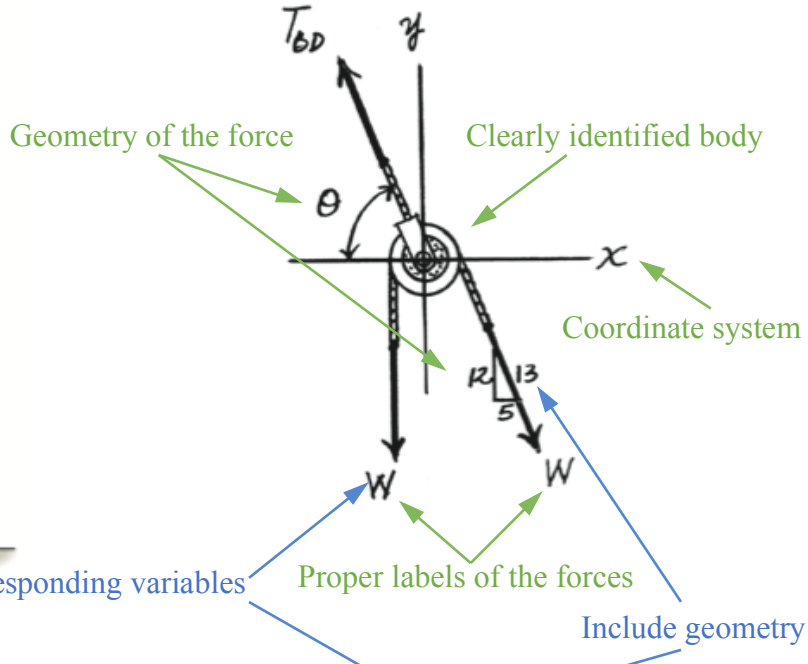
DIRECTION: On each problem solution page, use the top half to clearly draw out a large FBD of the specified body/bodies, and the bottom half to write the corresponding equations of equilibrium with given geometry for the diagram. DO NOT SOLVE THE PROBLEM.

General "Written Assignment Instructions" applies. Additional grading criteria includes: 1) proper use of page space for FBD and EoE; 2) properly labeled external forces on the body; 3) properly labeled geometry of the forces; 4) coordinate system; 5) variables and geometry 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



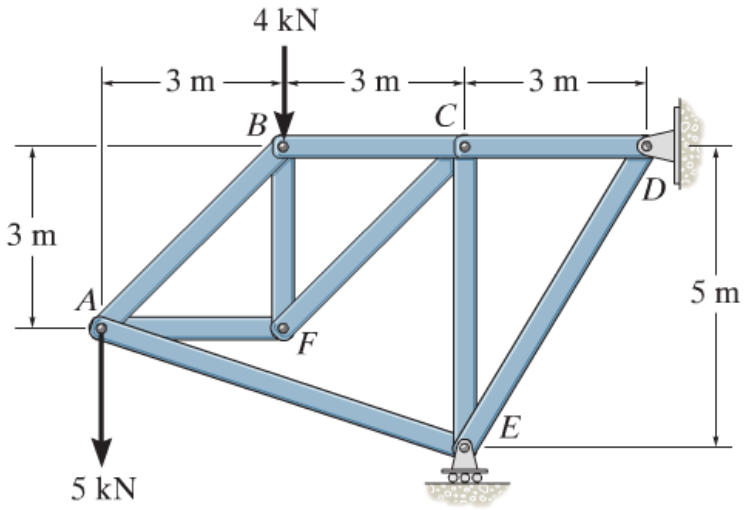
Sample EoE Solution

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

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

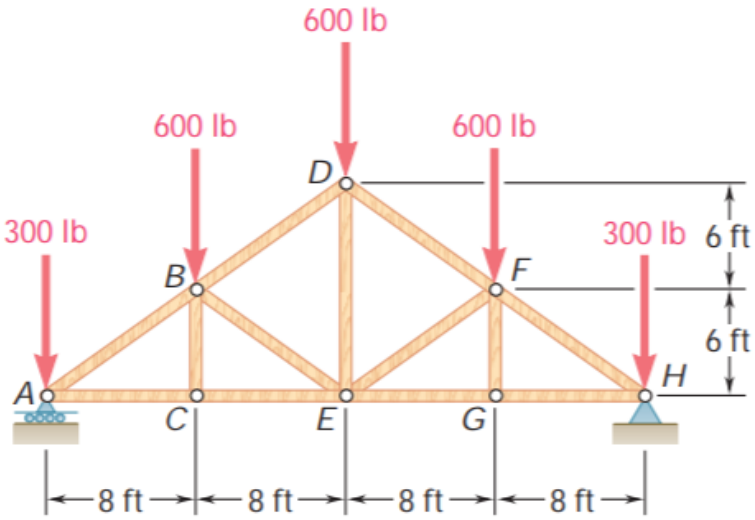
Problems 1: Draw the free body diagrams and write the corresponding equations of equilibrium for

A) the whole truss, and
B) joints *D* and *C*, separately.

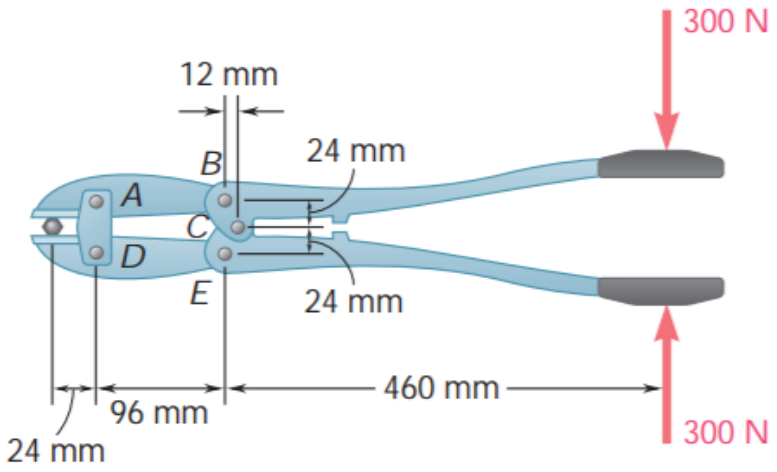


Problem 2: Draw the free body diagrams and write the corresponding equations of equilibrium for

A) the whole truss, and
B) the section to determine the forces in members *DF*, *EF* and *EG*.



Problem 3: When using the bolt cutter shown, Professor Hsiao-Wecksler applies two 300-N forces to the handles. Draw the free body diagrams and write the corresponding equations of equilibrium for members *BC*, *AB* and *AD* in the bolt cutter.



Problem 4: The toggle clamp is subjected to a force **F** at the handle. Draw the free body diagrams and write the corresponding equations of equilibrium for members *BC*, *CD* and *EBA*.