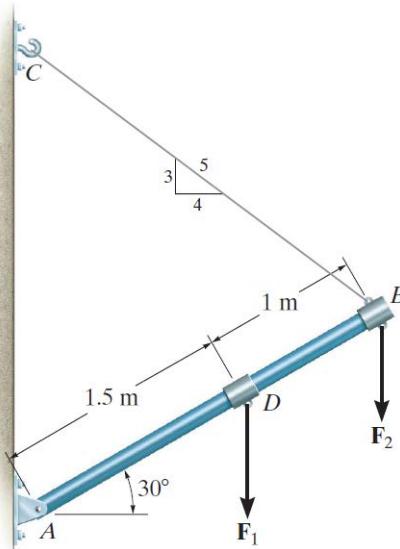


EGM 3420C - Engineering Mechanics

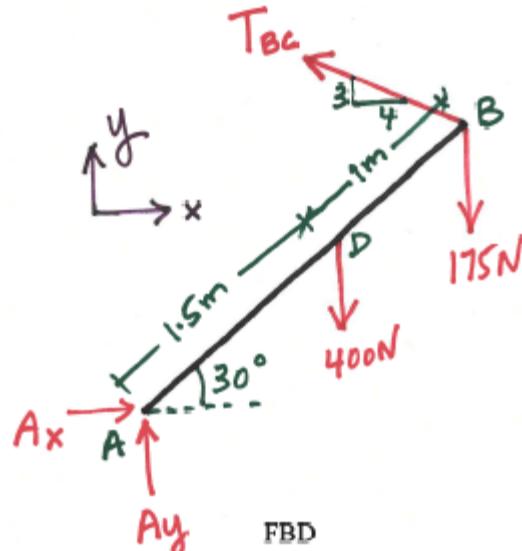
Statics Review 1 Problems

Problem 5

- a. The shown boom ABD is supported by a pin at A and a cable BC . Draw the complete free body diagram of the boom. Set $F_1 = 400 \text{ N}$ and $F_2 = 175 \text{ N}$



b.



Determine all unknown reactions at support A and the force in cable BC .

$$\begin{aligned} \sum M_A = 0 &= -400(1.5 \cos 30) - 175(2.5 \cos 30) + T_{BC} \left(\frac{4}{5}\right)(2.5 \sin 30) \\ &\quad + T_{BC} \left(\frac{3}{5}\right)(2.5 \cos 30) \\ 0 &= -519.62 - 378.89 + T_{BC} + 1.299 T_{BC} \Rightarrow T_{BC} = 390.83 \text{ N} \\ \rightarrow \sum F_x = 0 &= A_x - T_{BC} \left(\frac{4}{5}\right) \Rightarrow A_x = 312.66 \text{ N} \rightarrow \\ &\quad \swarrow 390.83 \text{ N} \quad \nearrow 390.83 \text{ N} \\ \uparrow \sum F_y = 0 &= A_y - 400 - 175 + T_{BC} \left(\frac{3}{5}\right) \Rightarrow A_y = 340.50 \text{ N} \uparrow \\ \text{Check } \sum M_B &= A_y(2.5 \cos 30) - A_x(2.5 \sin 30) - 400(1 \cos 30) \\ &= 737.20 - 390.8 - 346.4 \\ &= 737.20 - 737.2 = 0 \text{ O.K.} \end{aligned}$$

ANSWER:

$$A_x = 313 \text{ N} \rightarrow \quad A_y = 341 \text{ N} \uparrow \quad T_{BC} = 391 \text{ N } \frac{3}{4} \text{ on AB}$$