

**4.166** In the frame shown in Figure P4.166, the members are pin-connected and their weights can be neglected. The 42 kN force is applied to the pin at C. Find:

- The reactions on the frame at A and E
- The components of the forces exerted by the pins at B and C on member ABC.

By inspection of  $\Sigma F_x$ ,  $A_x = 42 \text{ kN}$

$$+\curvearrowright \Sigma M_A = E_y(14) - 42(6)$$

$$- 28(7) = 0$$

$$E_y = 32 \text{ kN}$$

$$\Sigma F_y \Rightarrow A_y = -4 \text{ kN}$$

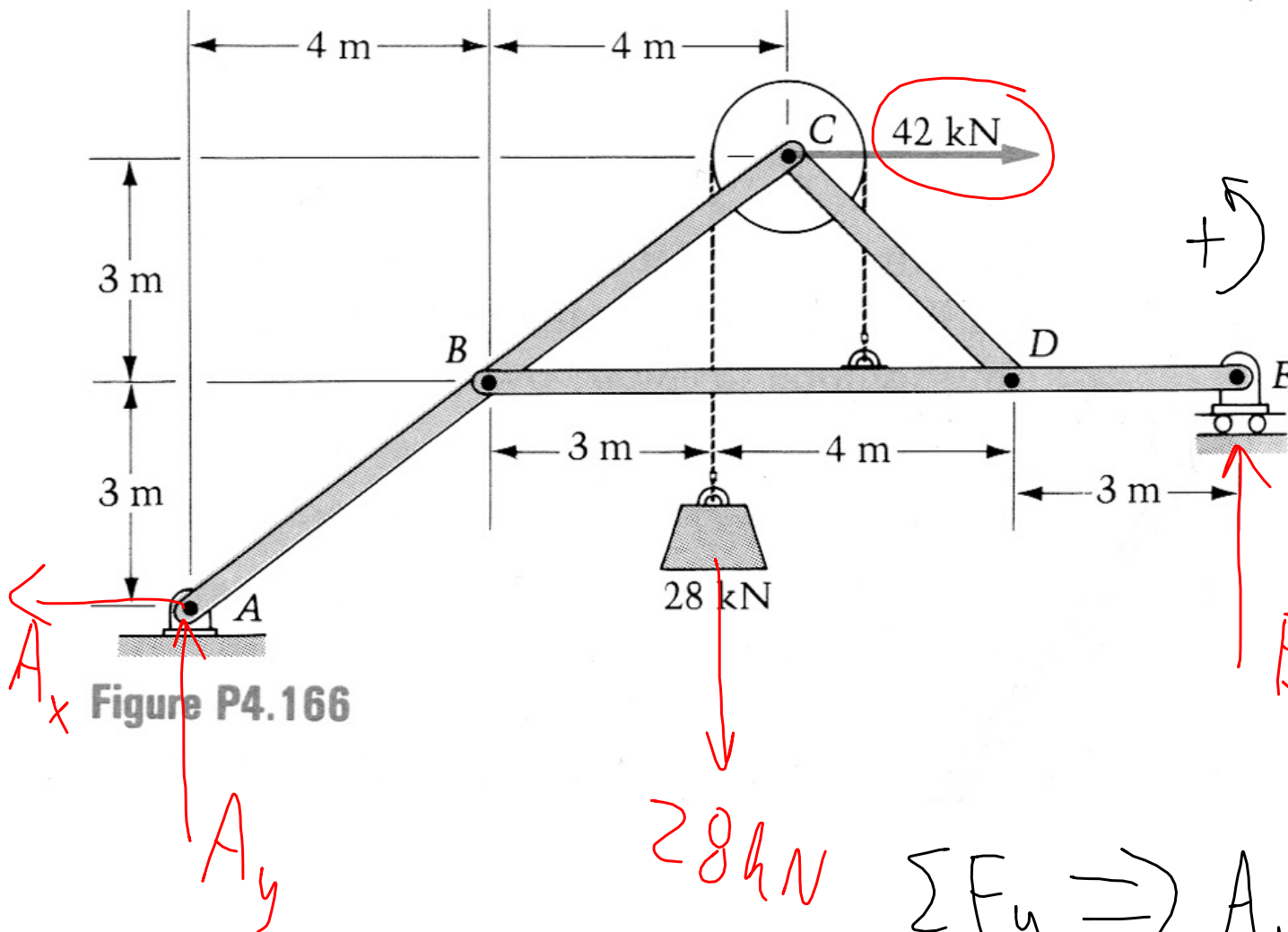
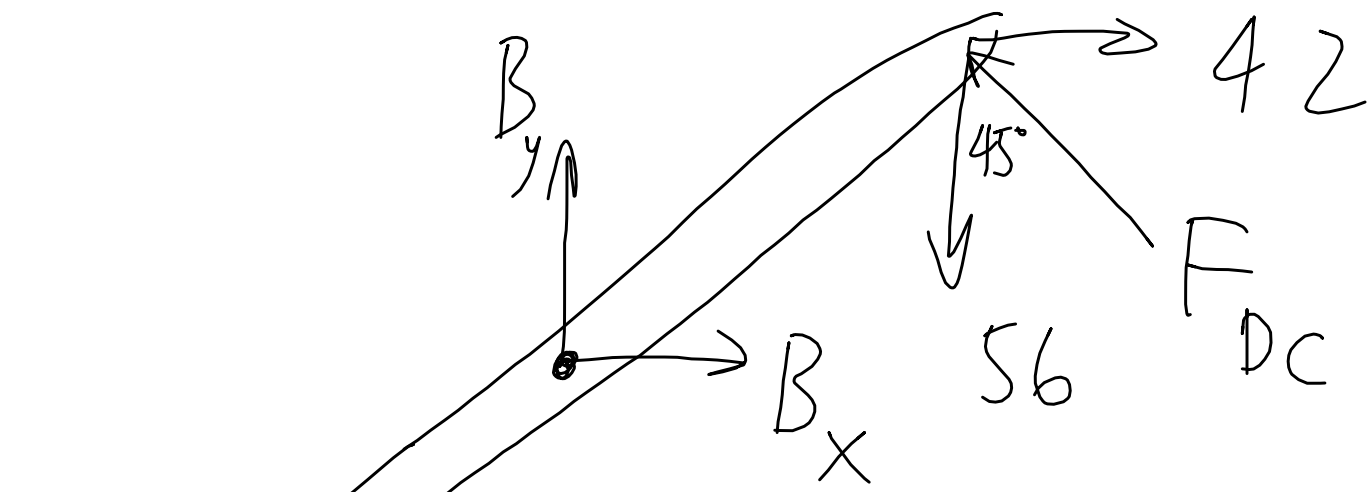


Figure P4.166

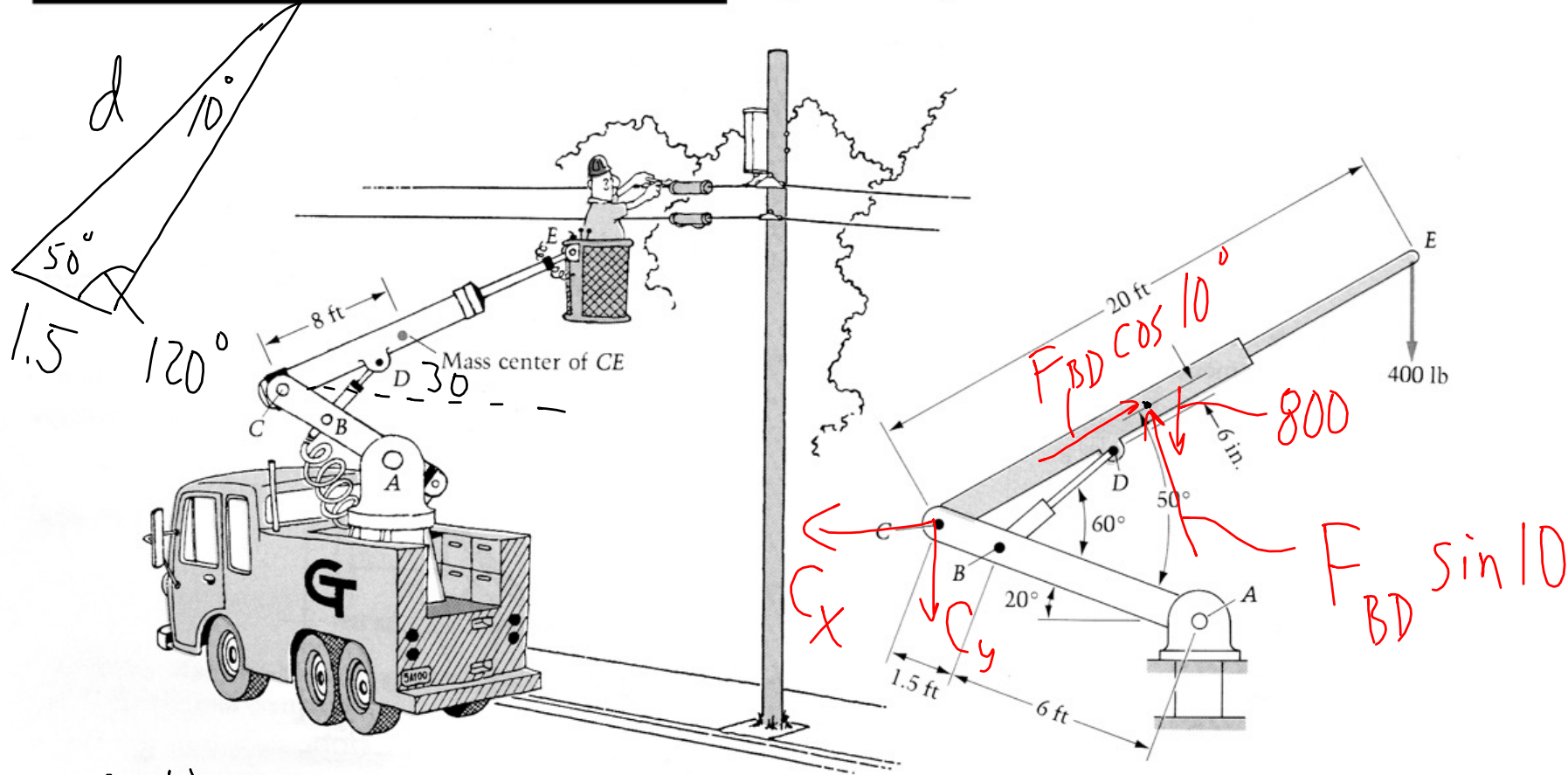


$$+\circlearrowleft \sum M_B = 4(4) - 42(3) - 42(3) - 56(4)$$

$$+ \frac{F_{DC}}{\sqrt{2}}(4) + \frac{F_{DC}}{\sqrt{2}}(3) = 0 \quad F_{DC} = 92.9 \text{ kN}$$

$$\sum F_x \Rightarrow B_x = 65.7 \quad \sum F_y \Rightarrow B_y = -5.7 \text{ kN}$$

4.186 A worker in a "cherry picker" is installing cable TV equipment. (See Figure P4.186.) If the man plus bucket weigh 400 lb and the extendable member CE weighs 800 lb, find the force in the hydraulic cylinder BD and the pin reactions at C onto the extendable member CE. Neglect the weight of BD.



$$\frac{\sin 10^\circ}{1.5} = \frac{\sin 120^\circ}{d} \quad d = 7.48'$$

$$\uparrow \sum M_c = F_{BD} \sin 10 (7.48) - 800 (8 \cos 30)$$

$$- 400 (20 \cos 30) = 0$$

$$F_{BD} = 9600 \text{ lbs}$$