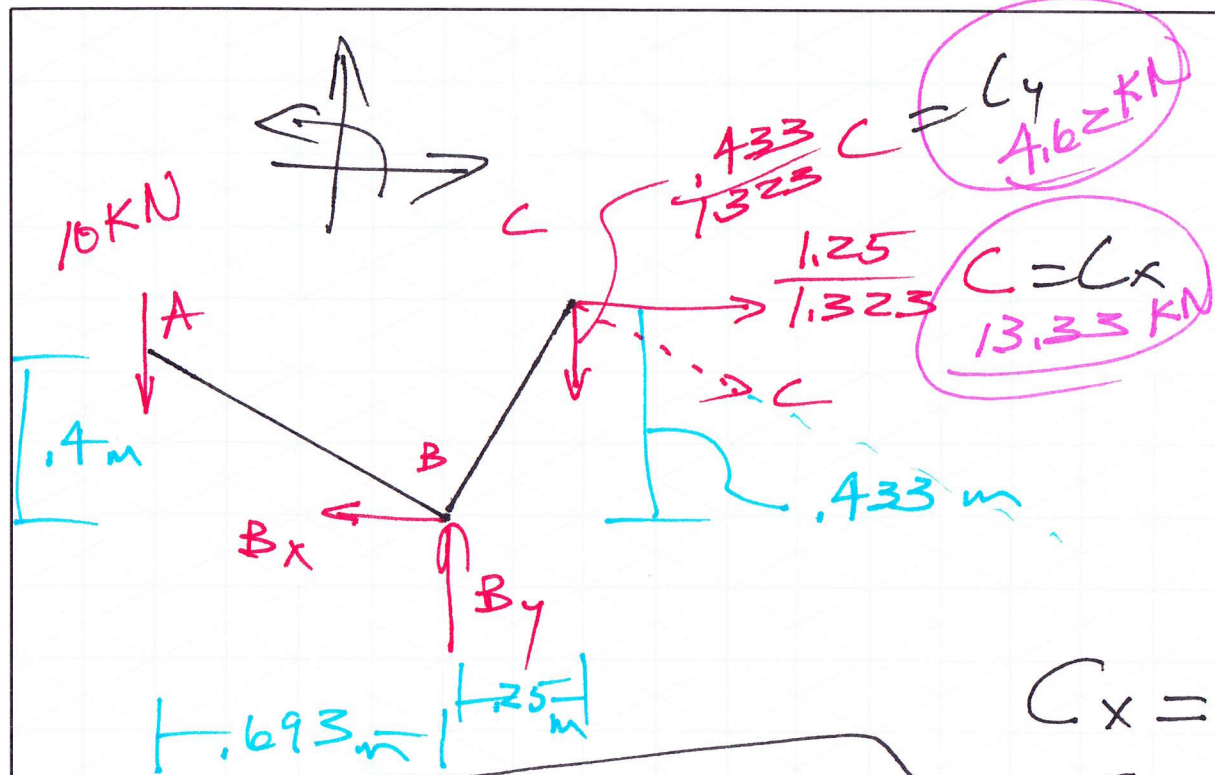


2-D Machines

Determine all forces acting on member ABC

$\theta = 30^\circ$

kN      m



$$\sum M_B = 0$$

$$+10(0.693) - \left(\frac{0.433}{1.323}\right)C(0.25) - \left(\frac{1.25}{1.323}\right)C(0.433) = 0$$

$$C = 14.11 \text{ kN}$$

$$C_x = \frac{1.25}{1.323} (14.11) = 13.33 \text{ kN}$$

$$C_y = \frac{0.433}{1.323} (14.11) = 4.62 \text{ kN}$$

$$\sum F_x = 0$$

$$-B_x + 13.33 = 0$$

$$B_x = 13.33 \text{ kN} \leftarrow$$

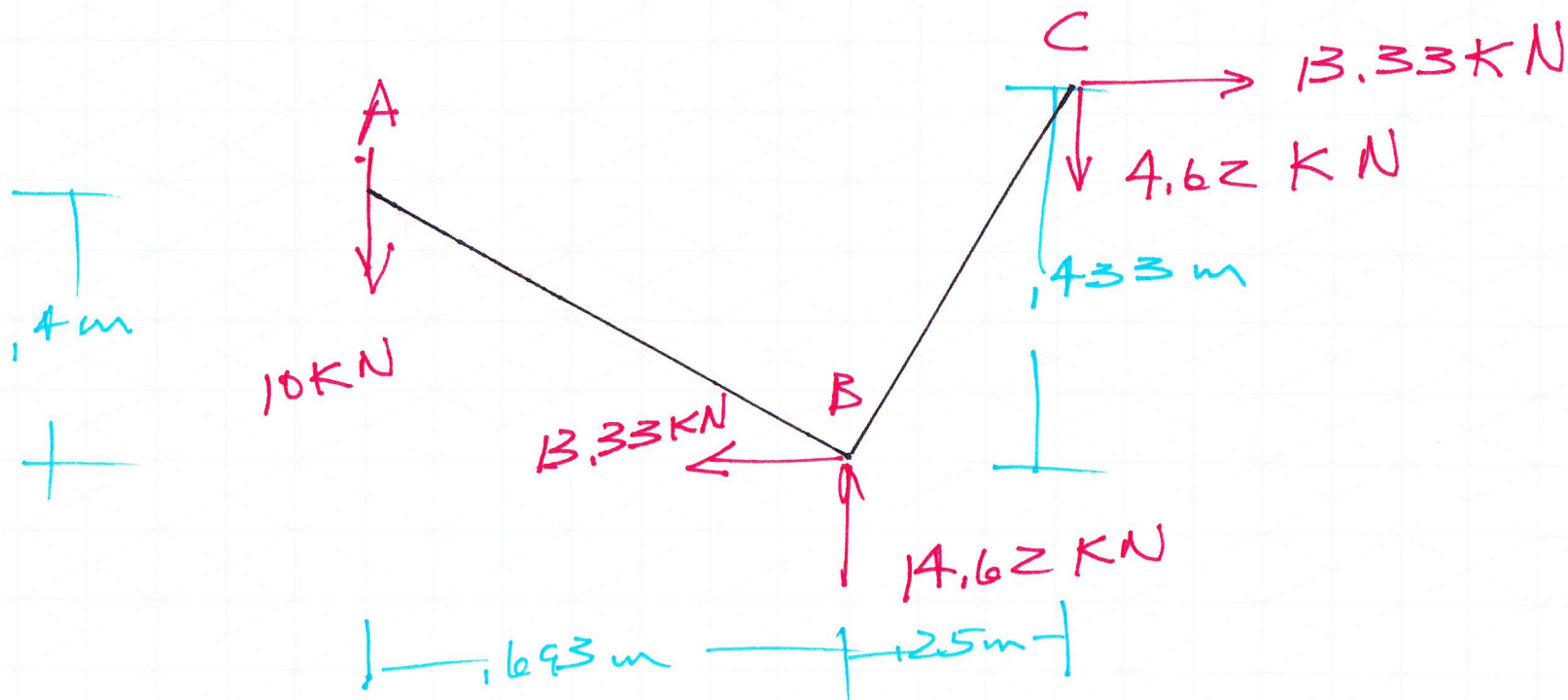
as shown

$$\sum F_y = 0$$

$$-10 + B_y - 4.62 = 0$$

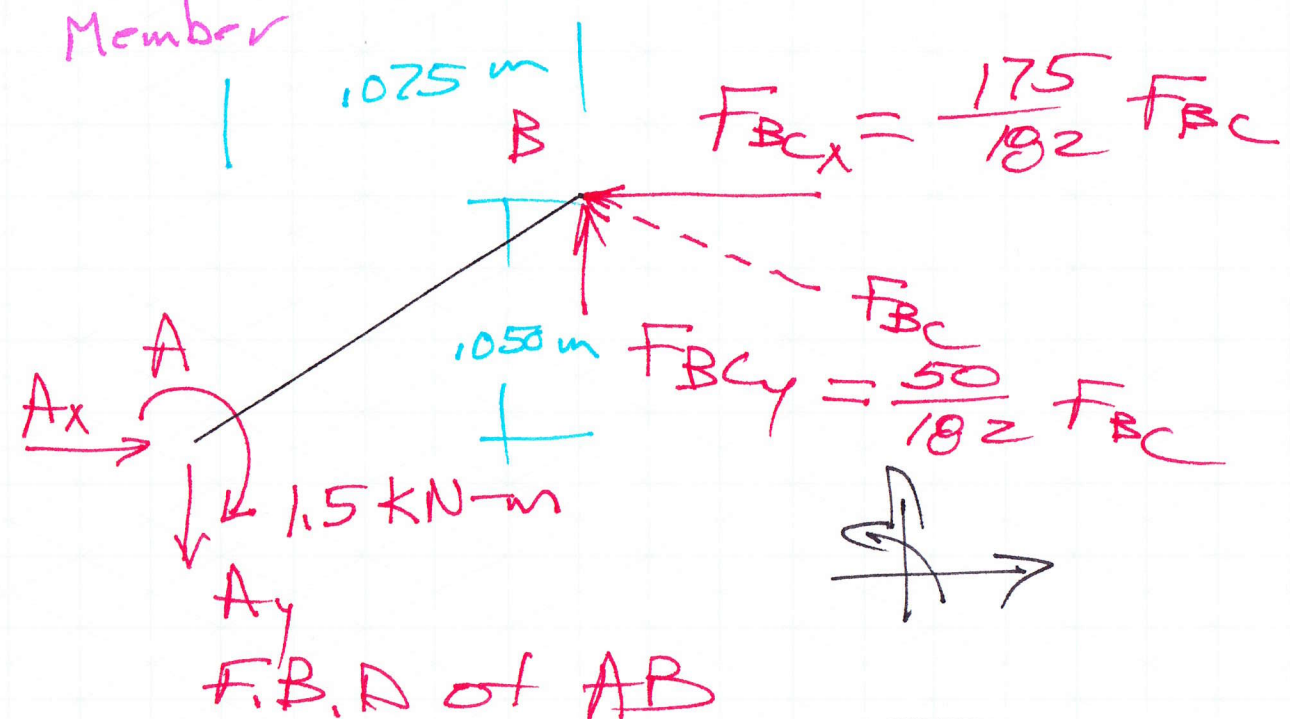
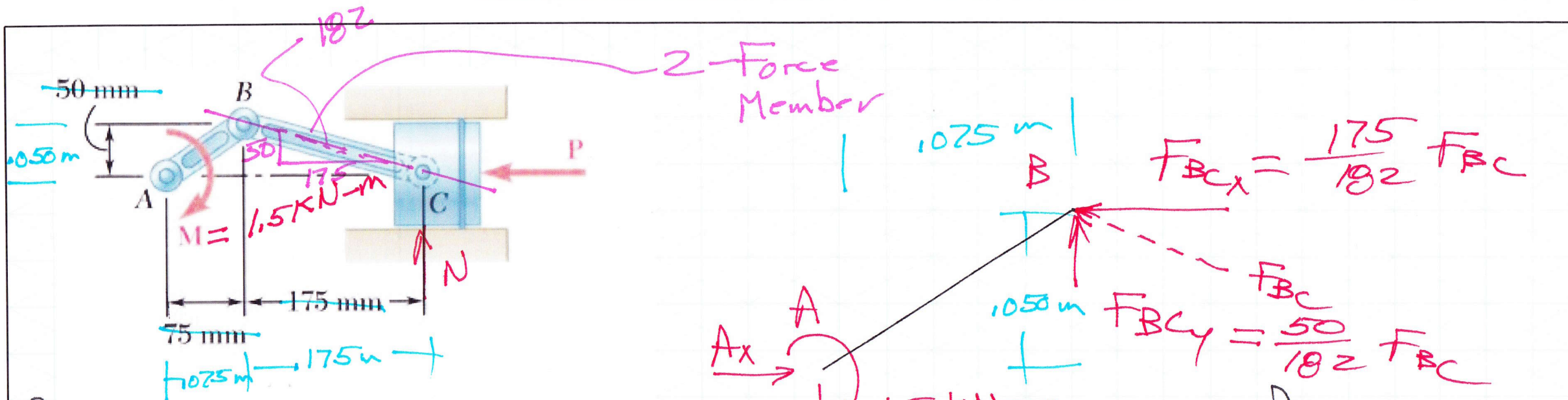
$$B_y = 14.62 \text{ kN} \uparrow$$

as shown



Summary of Forces  
 Acting on Member ABC





$$\sum M_A = 0$$

$$-1.5 + \frac{50}{182} F_{BC} (1075) + \frac{175}{182} F_{BC} (1050) = 0$$

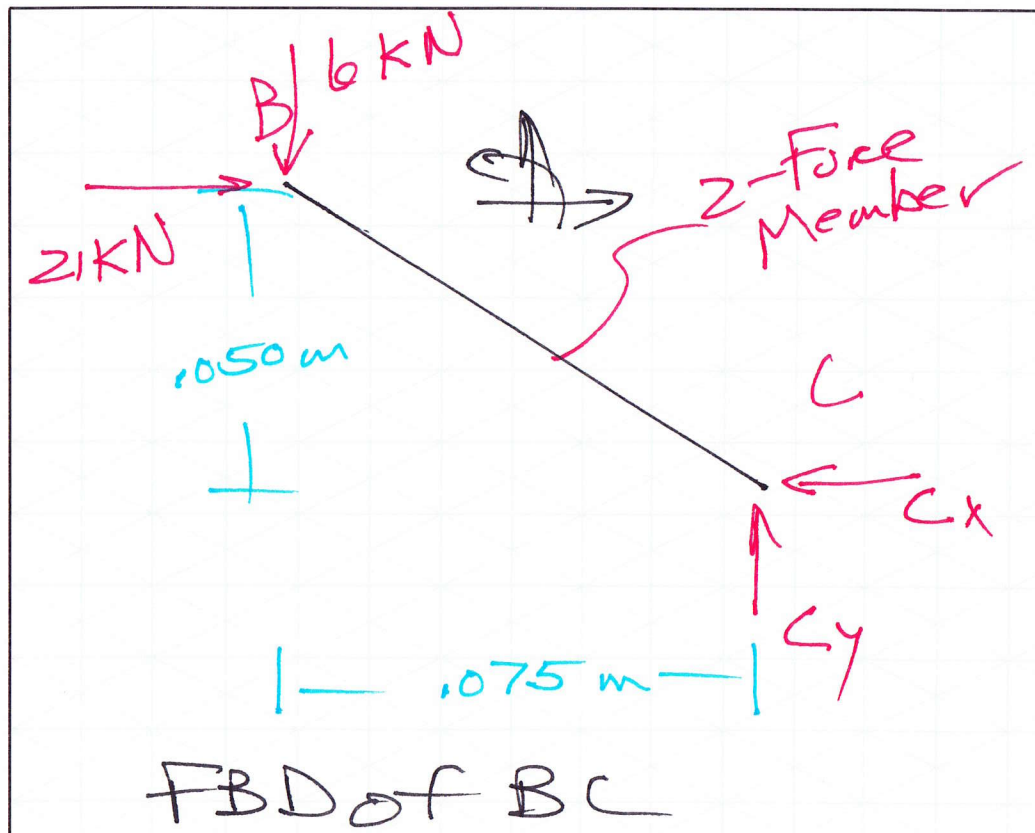
$$F_{BC} = + 21.84 \text{ kN}$$

as shown

$$F_{BCx} = \frac{175}{182} (21.84) = 21 \text{ kN} \leftarrow$$


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$$F_{BCy} = \frac{50}{182} (21.84) = 6 \text{ kN} \uparrow$$



$$\rightarrow \sum F_x = 0$$

$$21 - C_x = 0$$

$$C_x = 21 \text{ kN} \leftarrow$$

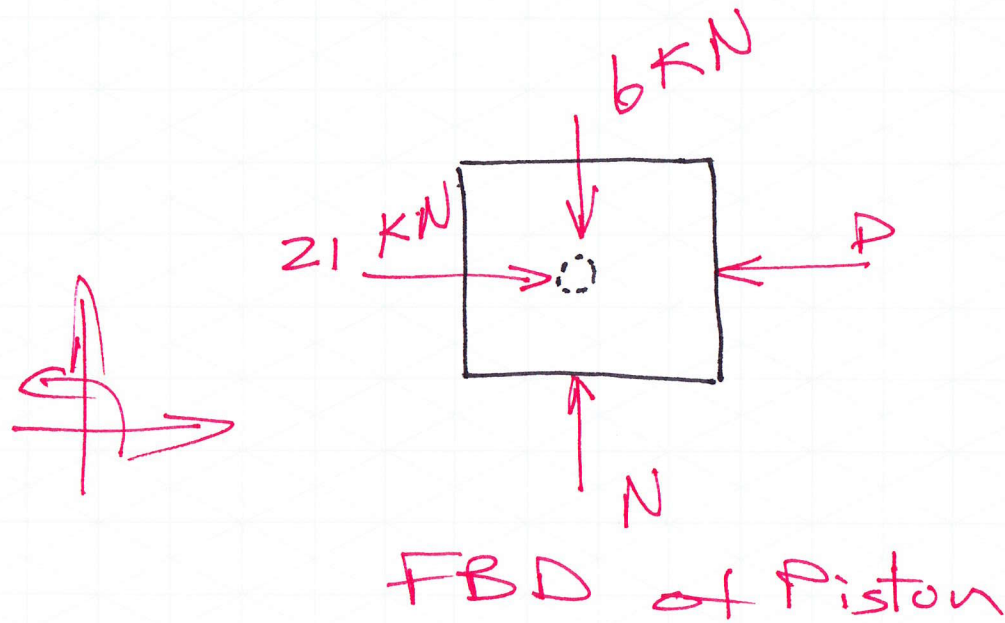
as shown

$$\uparrow \sum F_y = 0$$

$$-6 + C_y = 0$$

$$C_y = 6 \text{ kN} \uparrow$$

as shown



$$+\uparrow \sum F_y = 0$$

$$-6 + N = 0$$

$$\underline{N = 6 \text{ kN } \uparrow}$$

as shown

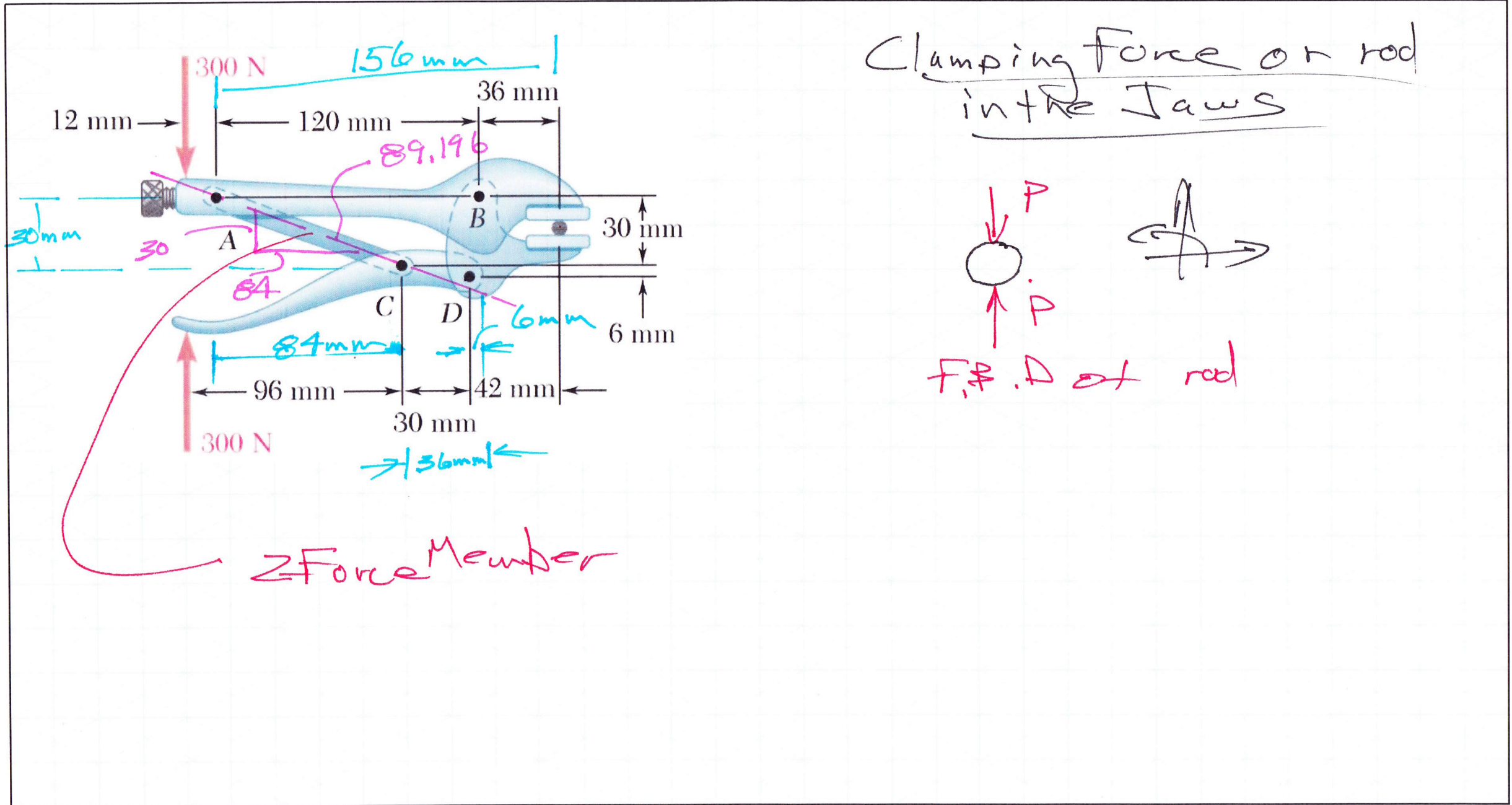
$$+\rightarrow \sum F_x = 0$$

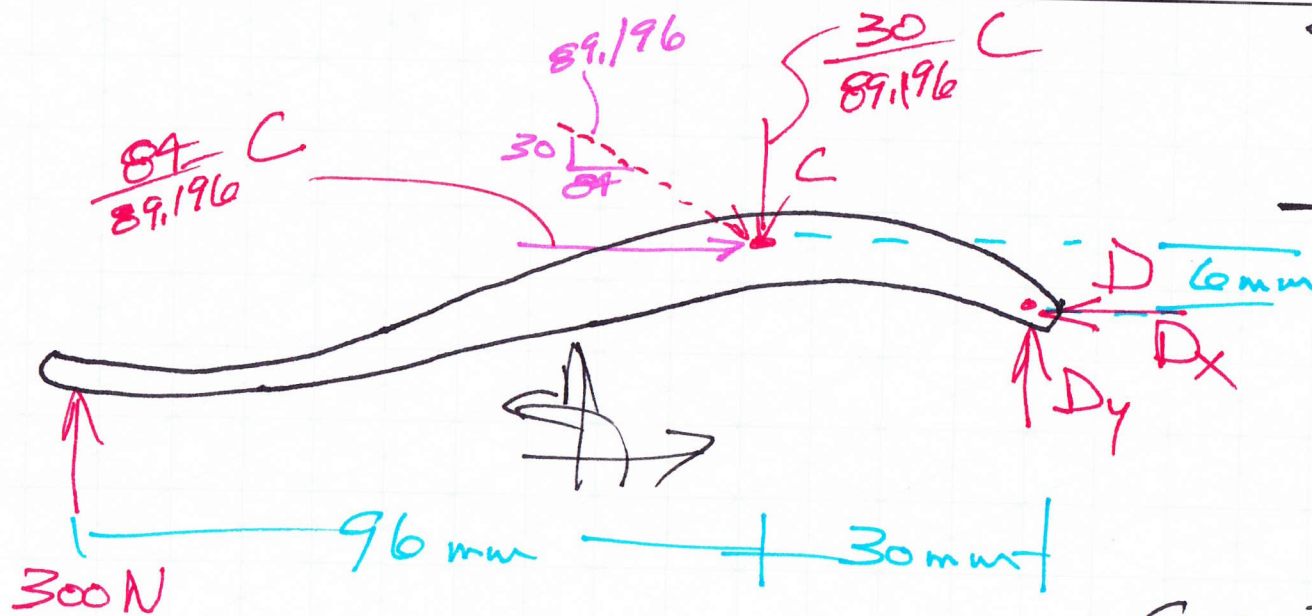
$$21 - P = 0$$

$$\underline{P = 21 \text{ kN } \leftarrow}$$

as shown







FBD for Lower Handle

$$\sum M_D = 0$$

$$-(300)(126) + \frac{30}{89.196} C (30)$$

$$- \frac{84}{89.196} C (6) = 0$$

$$C = 8514.2 \text{ N}$$

$$C_x = \frac{84}{89.196} (8514.2) = 8018 \text{ as shown}$$

$$C_y = \frac{30}{89.196} (8514.2) = 2864 \text{ N}$$

$$\sum F_x = 0$$

$$8018 - D_x = 0$$

$$D_x = 8018 \text{ N} \leftarrow$$

as shown

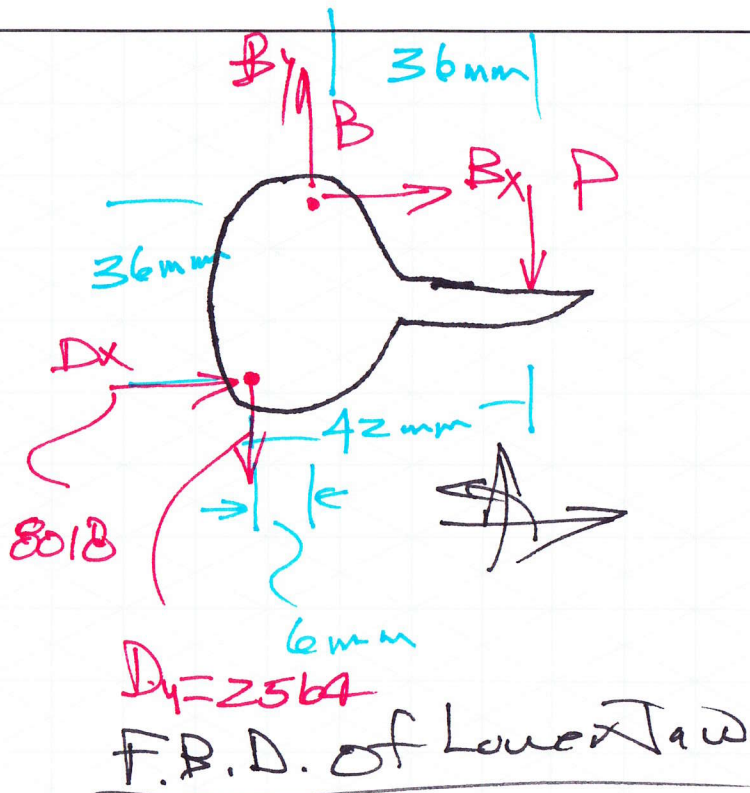
$$\sum F_y = 0$$

$$300 - 2864 + D_y = 0$$

$$D_y = 2564 \text{ N} \uparrow$$

as shown





$$\sum M_B = 0$$

$$+ \cancel{D_x} 36 + \cancel{D_y} (6) - P(36) = 0$$

$$P = \frac{8445 \text{ N}}{\downarrow}$$

as shown

$$\sum F_x = 0$$

$$\cancel{D_x} + B_x = 0$$

$$B_x = -8018 \text{ N or } 8018 \text{ N} \leftarrow$$

Not as shown

$$\sum F_y = 0$$

$$- \cancel{D_y} + B_y - P = 0$$

$$B_y = +11009 \text{ N} \uparrow$$

as shown

