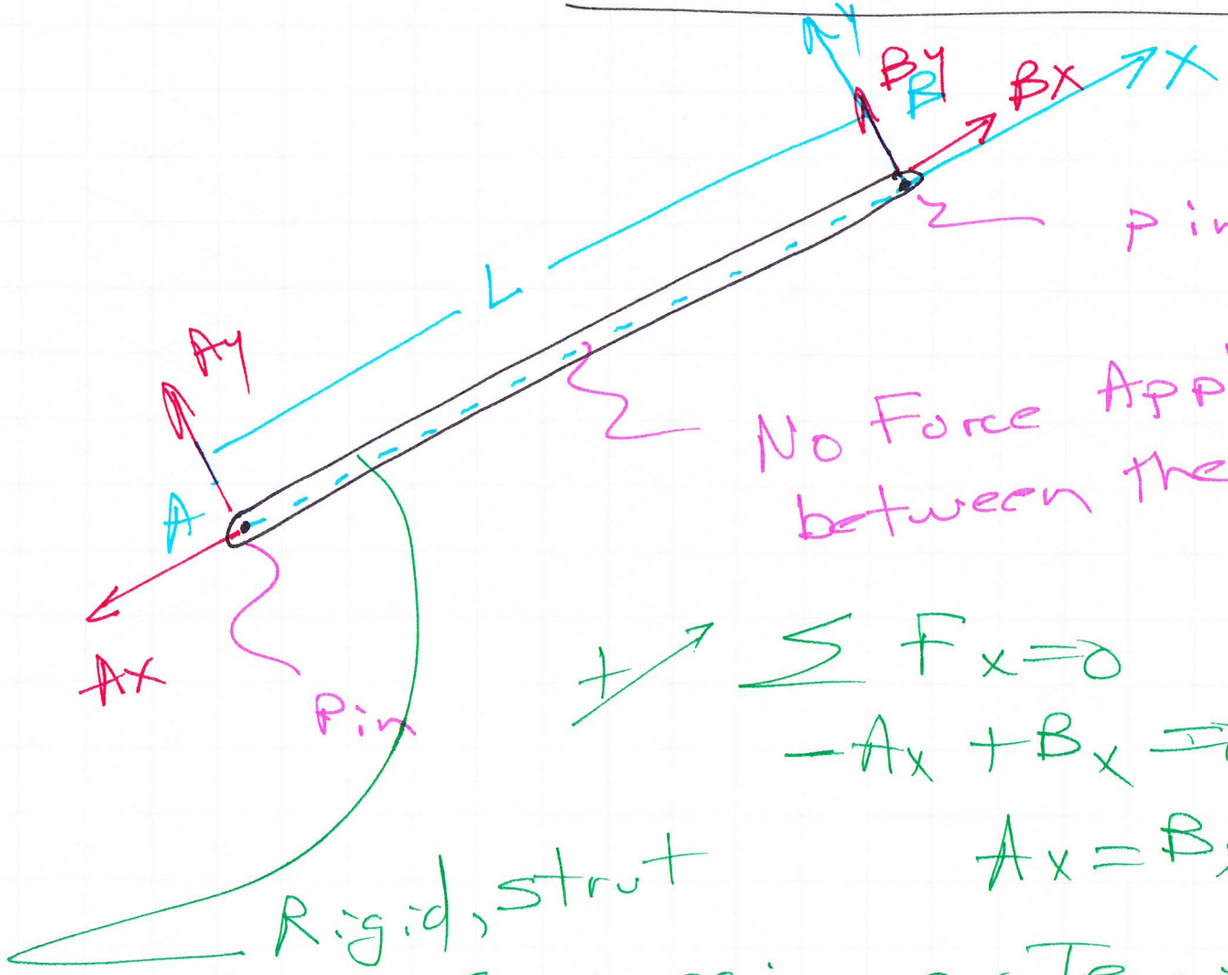
Two-Force Body



No Force Applied between the pins

$$\circlearrowleft + \sum M_A = 0$$

$$B_y L = 0$$

$$B_y = 0$$

$$\circlearrowleft + \sum M_B = 0$$

$$-A_y L = 0$$

$$A_y = 0$$

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

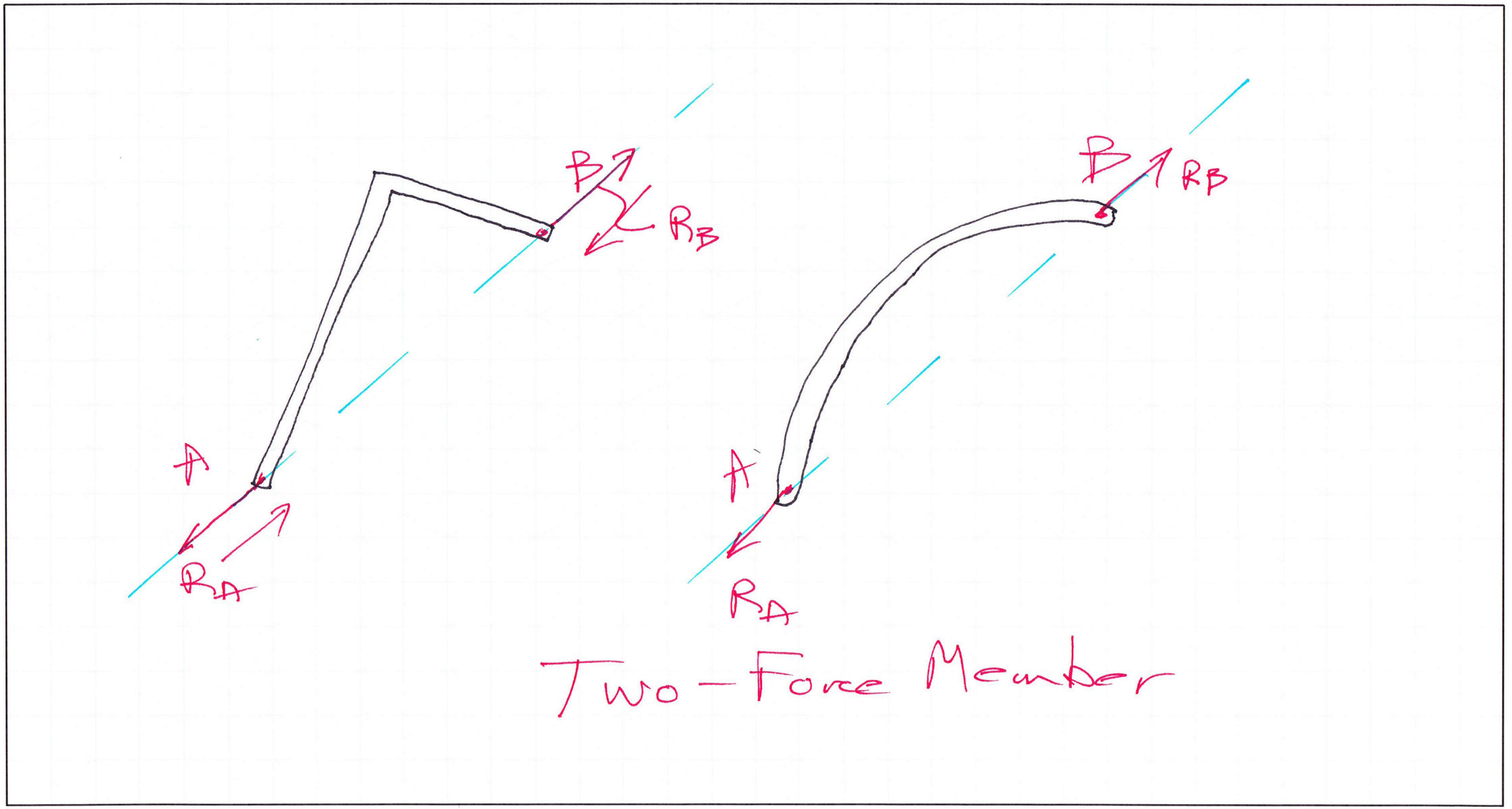
$$-A_x + B_x = 0$$

$$A_x = B_x$$

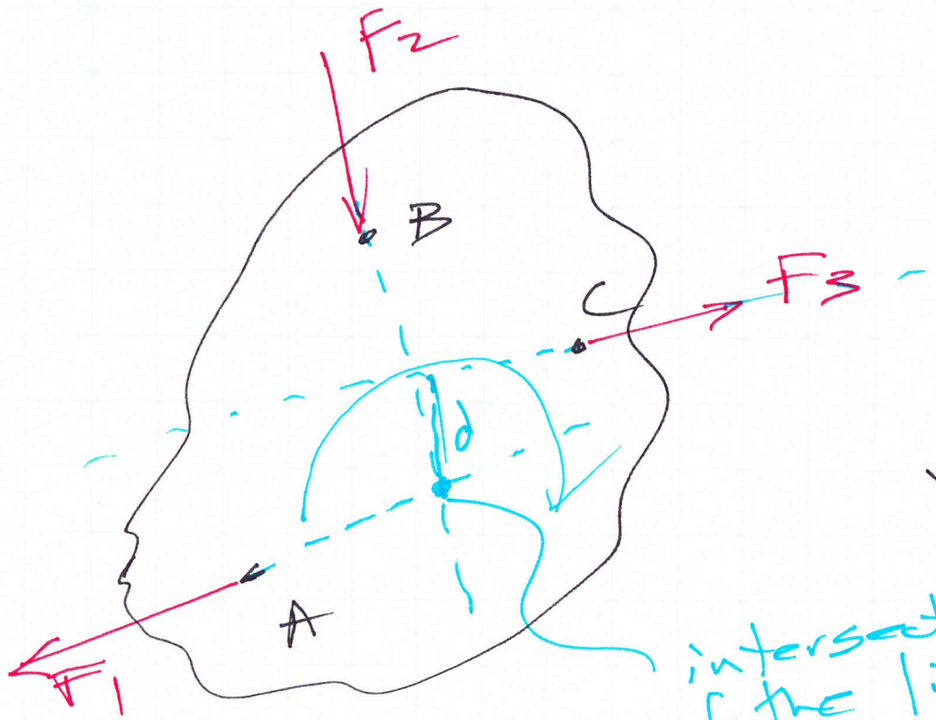
Rigid, strut

Compression or Tension

Its line of action goes through the points of support.



Three - Force Body



The only possible way that 3 general forces can be in equilibrium is if their lines of action intersect at a common point — Concurrent forces

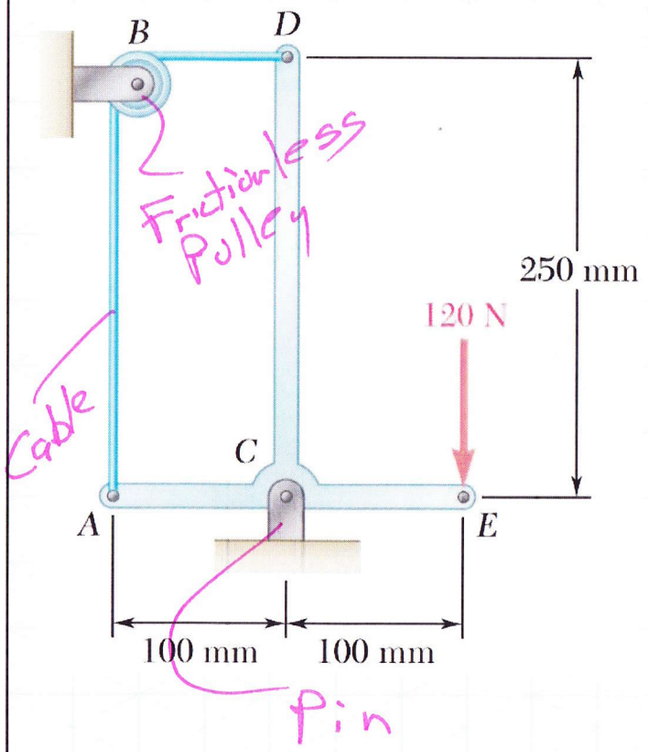
CANNot be in equilibrium

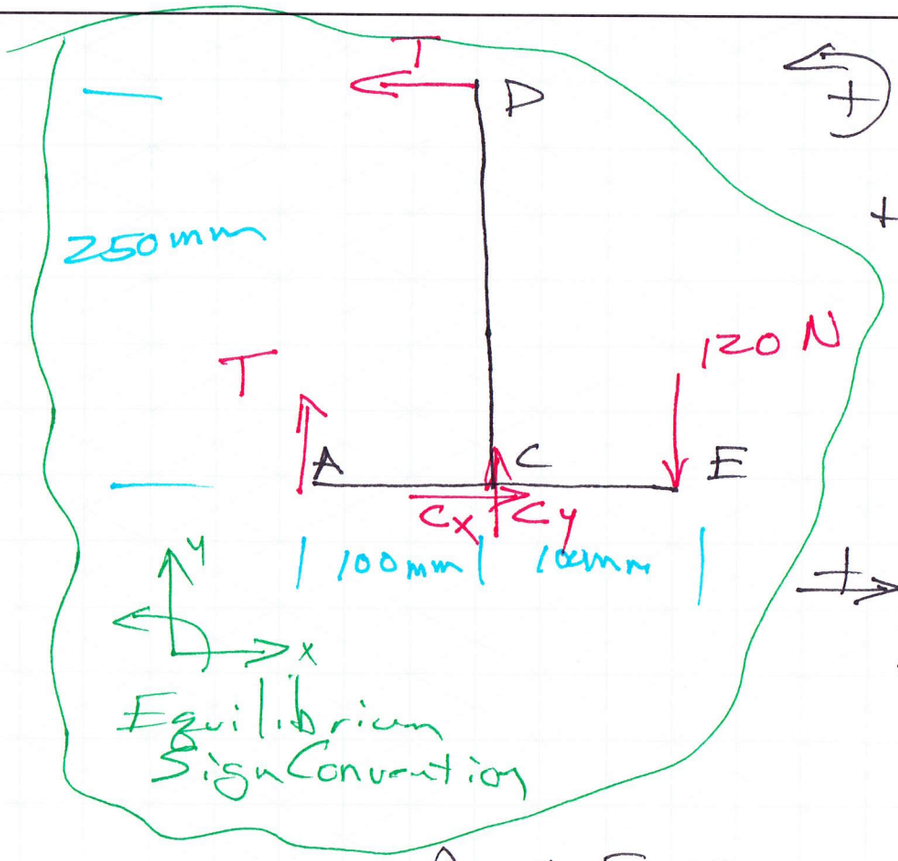
intersection of the lines of action of $\vec{F}_1$ and $\vec{F}_2$

If all three forces are parallel — then equilibrium is possible.

Usually work in Laws of Sines and Cosines

or rectangular components and just solve the problem.





$+\circlearrowleft \sum M_C = 0$

$+T(250) - T(100) - 120(100) = 0$

$150T = 12000$

$T = 80\ N$ (tension)

as shown

$\pm \rightarrow \sum F_x = 0$

$-80 + C_x = 0$

$C_x = 80\ N \rightarrow$

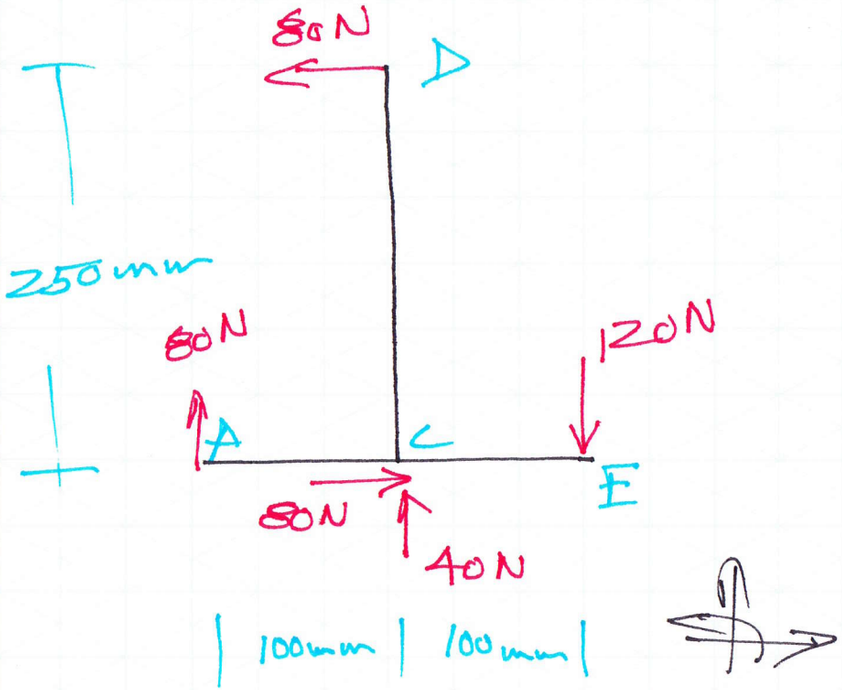
as shown

$+\uparrow \sum F_y = 0$

$+80 + C_y - 120 = 0$

$C_y = 40\ N \uparrow$

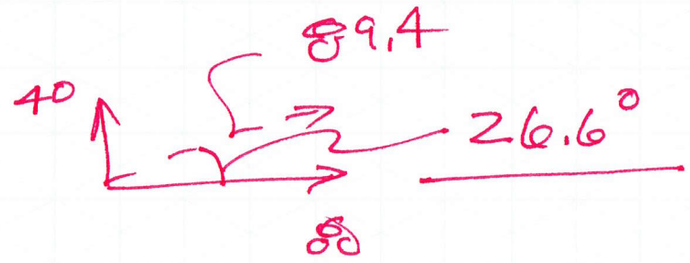
as shown

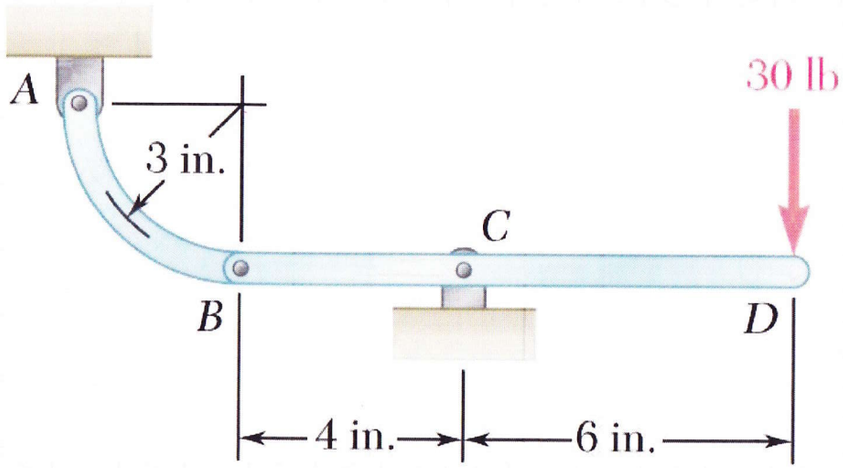


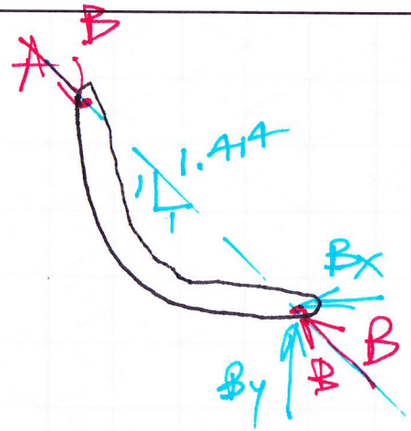
Summary Sketch of Results

$$\vec{C} = 80\,\hat{i} + 40\,\hat{j} \quad N$$

$$|\vec{C}| = 89.4 \quad N$$



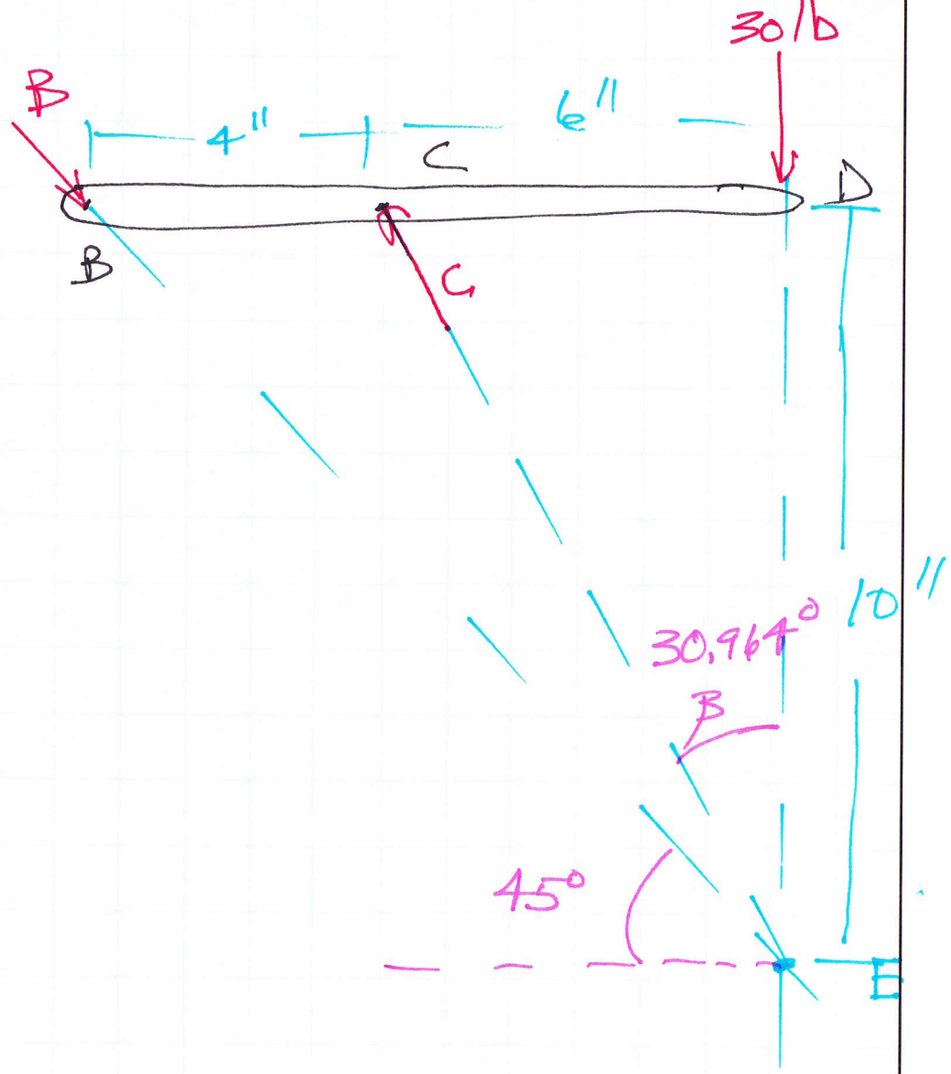


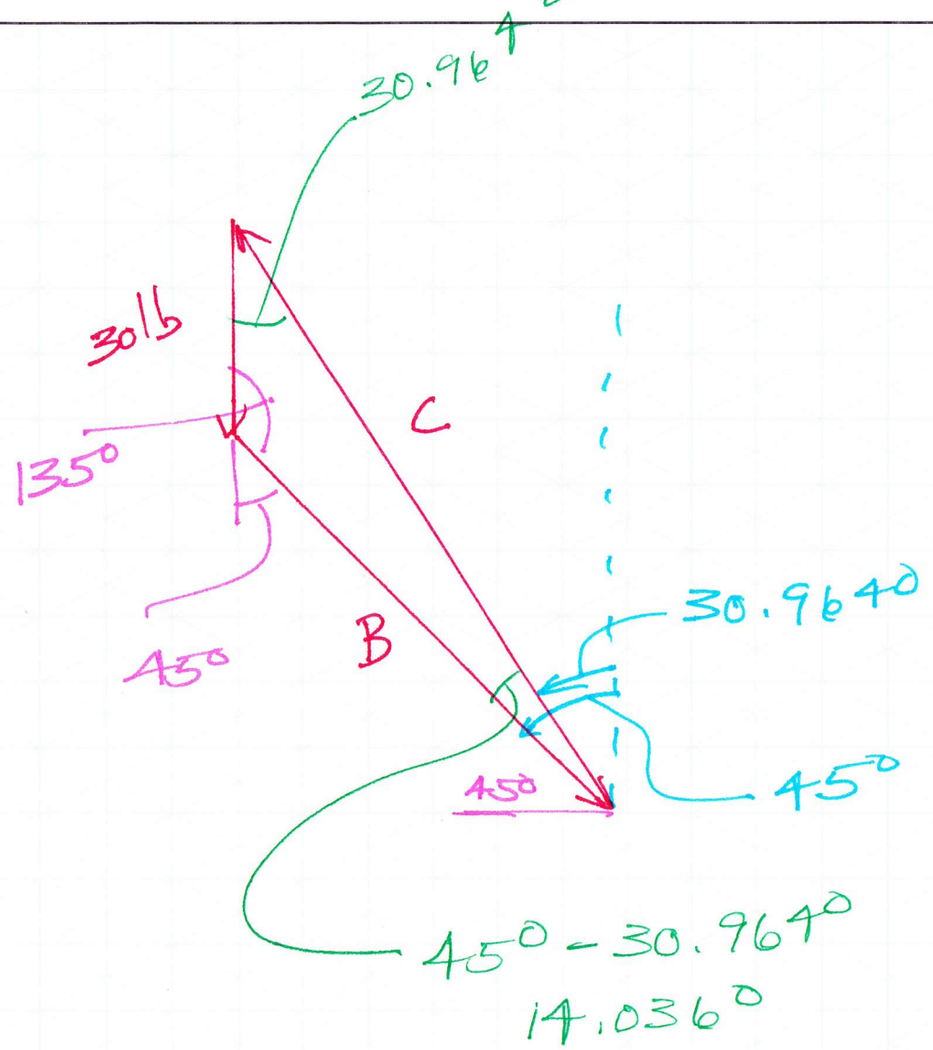


2-Force Member

$$\beta = \tan^{-1}\left(\frac{6}{10}\right)$$

$$\beta = 30.964^\circ$$



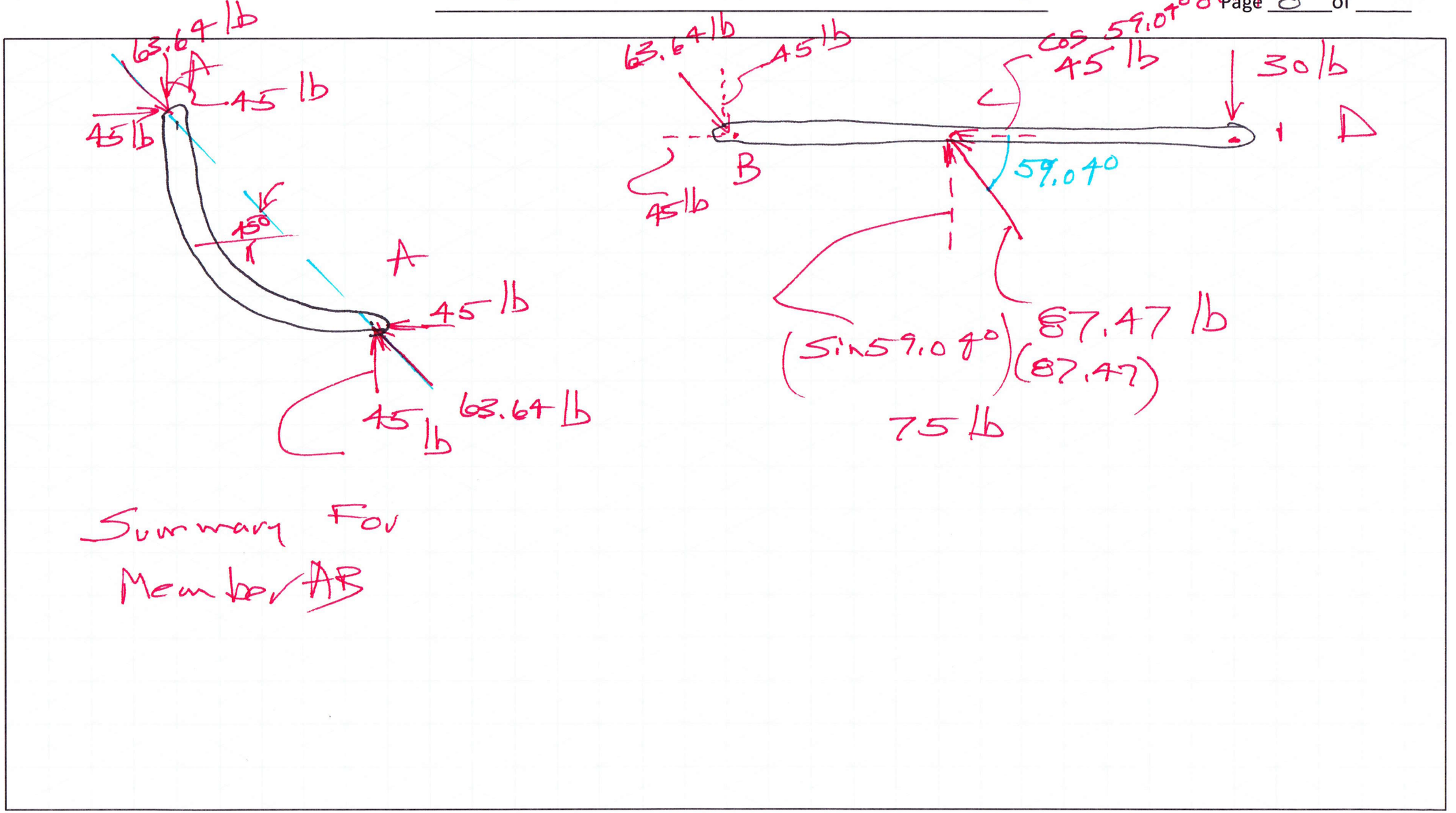


Law of Sines

$$\frac{30}{\sin 14.036^\circ} = \frac{B}{\sin 30.96^\circ} = \frac{C}{\sin 135^\circ}$$

$$B = 63.64 \text{ lb}$$

$$C = 87.47 \text{ lb}$$



Summary For Member AB

Topic Equilibrium of a Rigid Body

Date 2/7/14
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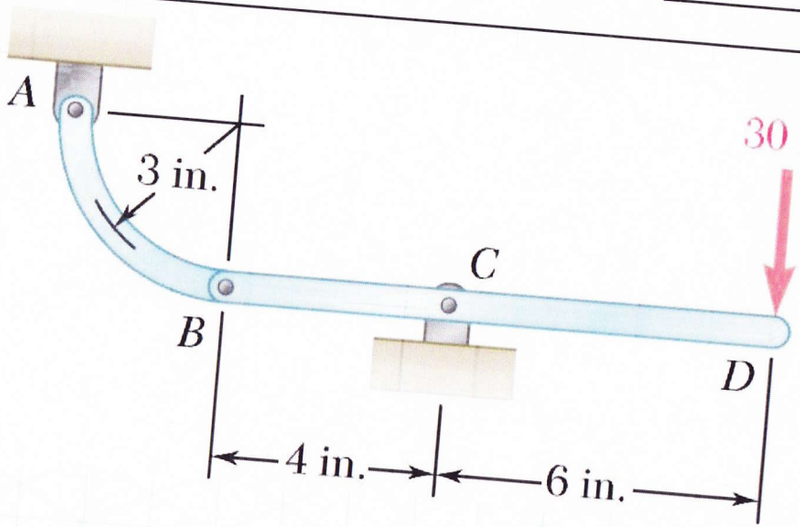
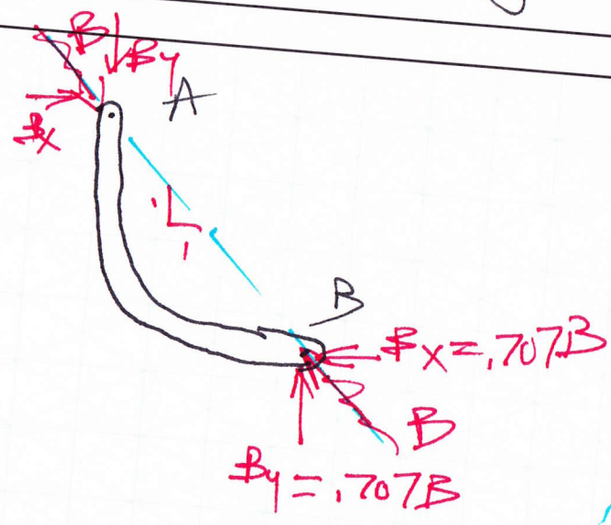
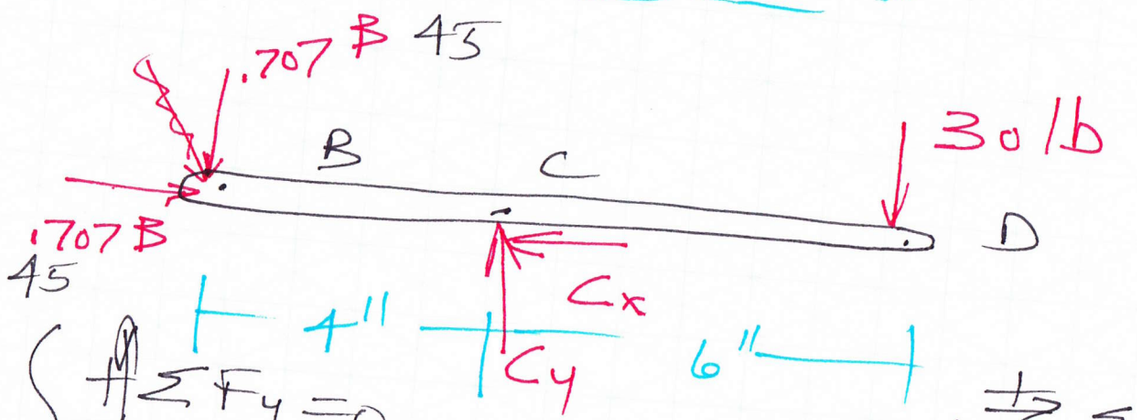






$\circlearrowleft \Sigma M_B = 0$

$+ C_y(4) - 30(10) = 0$

$C_y = 75$ lb as shown

$+\uparrow \Sigma F_y = 0$

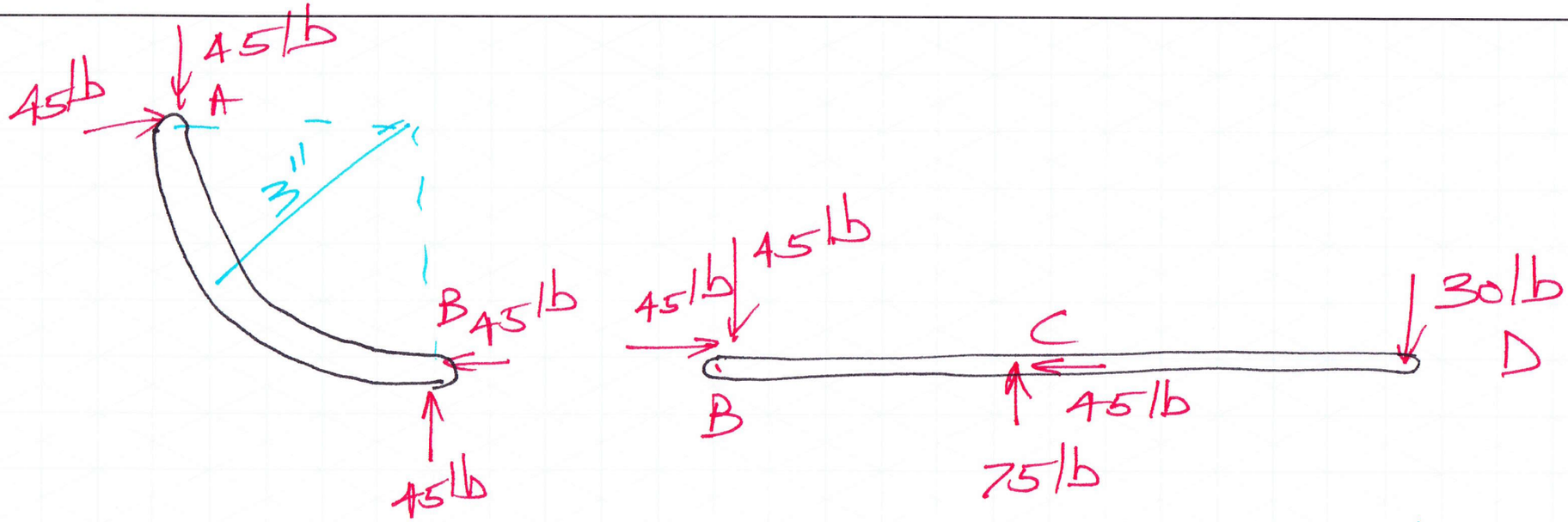
$-.707B + 75 - 30 = 0$

$B = 63.65$ lb as shown

$\pm \Sigma F_x = 0$

$.707(63.65) - C_x = 0$

$C_x = 45$ lb as shown



Summary of Results