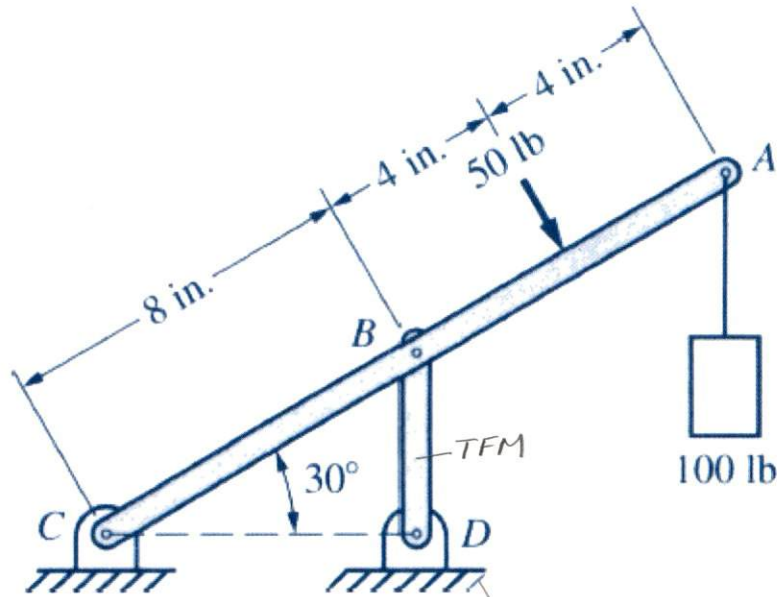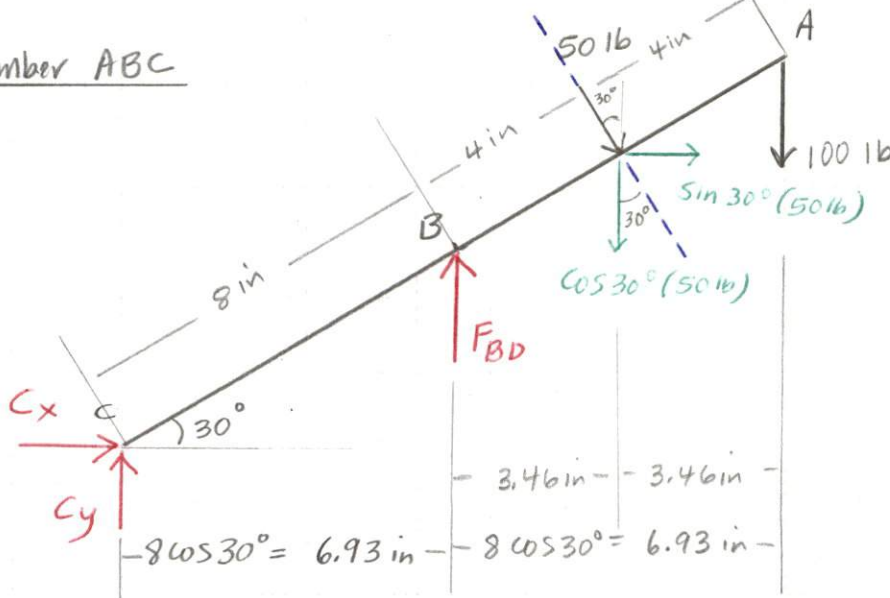4-29 Refer to Fig. P4-29. Determine the forces in each member of the frame subjected to the load shown.
Solution.

Member ABC

FBD- member ABC

Equilibrium Equations

$[\Sigma F_x = 0]$ $C_x + \sin 30°(50\,lb) = 0$

$C_x = -25\,lb \longrightarrow$ and $\boxed{C_x = 25\,lb \longleftarrow}$

$(\Sigma M_c = 0)$ $F_{BD}(6.93\,in) - 50\,lb(12\,in) - 100\,lb(13.86\,in) = 0$

$F_{BD} = \dfrac{1986\,lb\cdot in}{6.93\,in} = 286.6\,lb$ (c)

$[\Sigma F_y = 0]$ $C_y + F_{BD} - \cos 30°(50\,lb) - 100\,lb = 0$

$C_y = 143.3\,lb - 286.6\,lb = -143.3\,lb \uparrow$

and $\boxed{C_y = 143.3\,lb \downarrow}$

Summarize Results

50 lb

A

100 lb

25 lb

B

43.3 lb

$C_x = 25$ lb

C

$F_{BD} = 286.6$ lb

$C_y = 143.3$ lb

member ABC

$F_{BD} = 286.6$ lb

B

D

$F_{BD} = 286.6$ lb

member BD   (TFM)
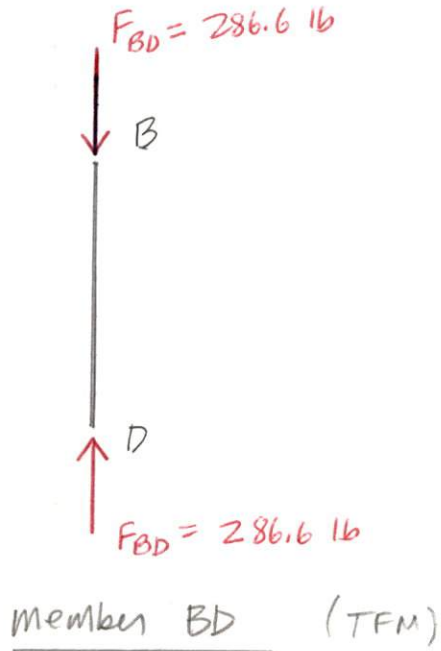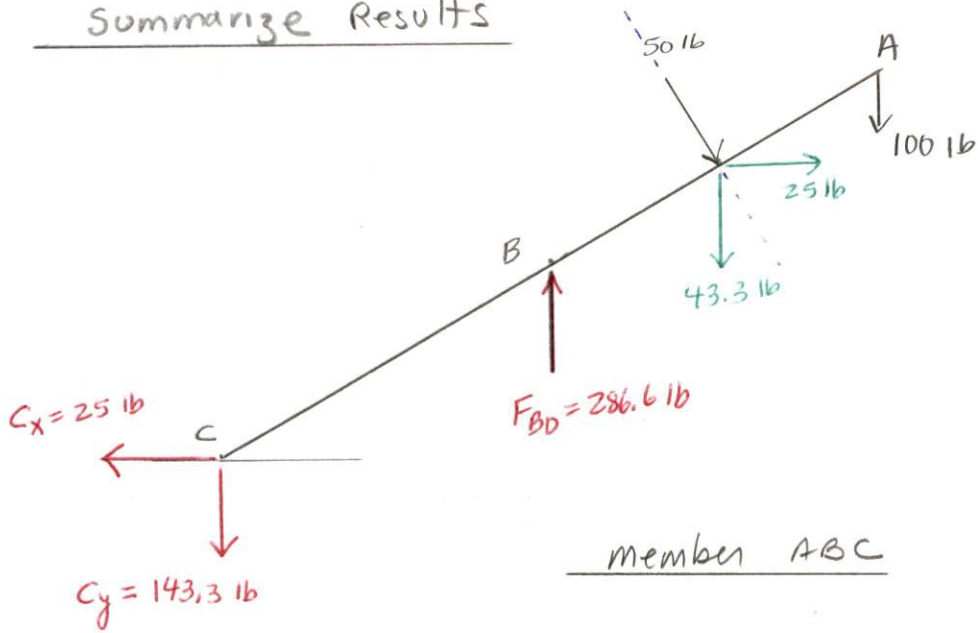
Both members are in equilibrium ✓