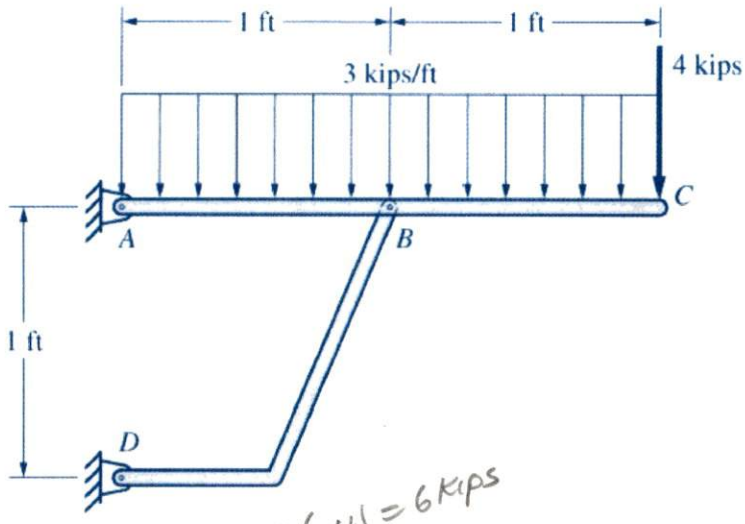
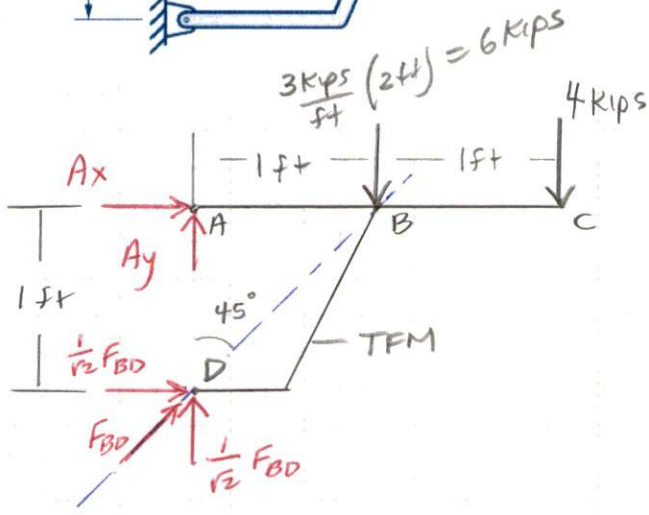
3-43

Refer to Fig. P3-43. Determine the reaction components at supports A and D due to the loads shown.

Solution.





ccw +M ↺
cw −M ↻

FBD

Equilibrium Equations

$[\Sigma M_D = 0] \quad -A_x(1\text{ ft}) - 6\text{ kips}(1\text{ ft}) - 4\text{ kips}(2\text{ ft}) = 0$

$A_x = \dfrac{-14\text{ kips}\cdot\text{ft}}{1\text{ ft}} = -14\text{ kips} \rightarrow$

and $\boxed{A_x = 14\text{ kips} \leftarrow}$

$[\Sigma F_x = 0] \quad A_x + \frac{1}{\sqrt{2}} F_{BD} = 0$

$F_{BD} = \frac{\sqrt{2}}{1}\left(-(-14\text{ kips})\right) = 19.7\text{ kips} \measuredangle 45°$

$[\Sigma F_y = 0] \quad A_y + \frac{1}{\sqrt{2}} F_{BD} - 6\text{ kips} - 4\text{ kips} = 0$

$A_y = 10\text{ kips} - \frac{1}{\sqrt{2}}(19.7\text{ kips}) = -4\text{ kips} \uparrow$

and $\boxed{A_y = 4\text{ kips} \downarrow}$