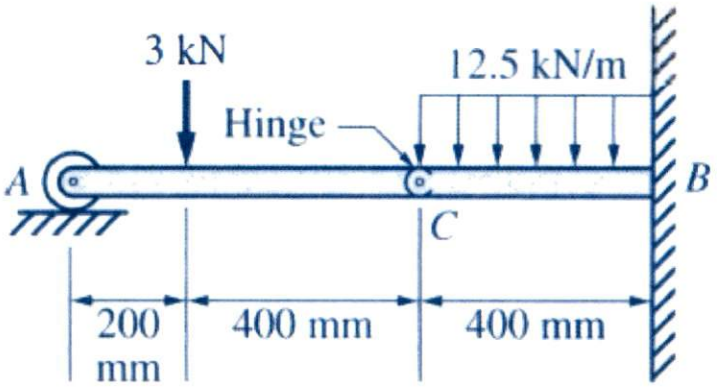
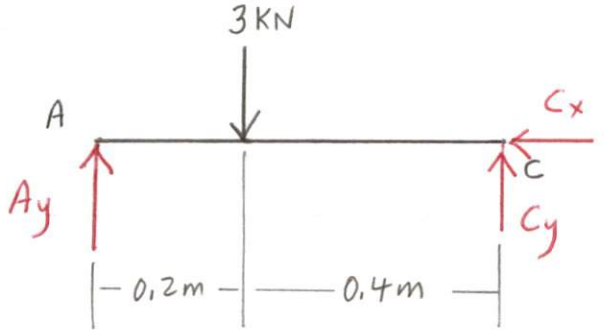
4-28 See Fig. P4-28. Determine the reactions at A and B of the beam due to the loads shown.
Solution.



"Fixed Support"

If the frame is in equilibrium, each member is in equilibrium

Member AC (unpin the frame @ C)



FBD- member AC

ccw +M ↺
cw −M ↻

Equilibrium Equations

$[\Sigma F_x = 0]$ $C_x = 0$

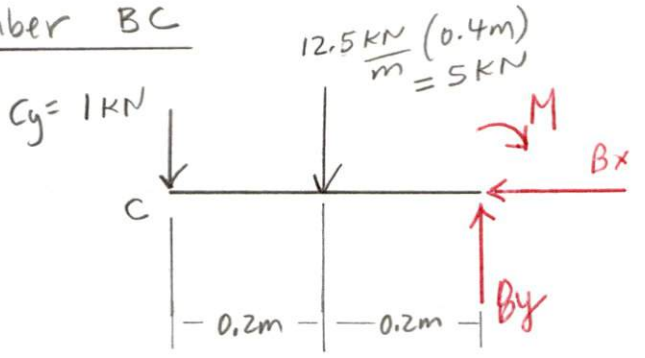
$[\Sigma M_C = 0]$ $-A_y(0.6m) + 3KN(0.4m) = 0$

$$A_y = \frac{1.2\ KN \cdot m}{0.6m} = \underline{\underline{2\ KN}}\ \uparrow$$

$[\Sigma F_y = 0]$ $2\ KN - 3KN + C_y = 0$

$$C_y = \underline{\underline{1\ KN}}\ \uparrow$$

Member BC



FBD- member BC

ccw +M ↺
cw -M ↻

Equilibrium Equations

$[\Sigma f_x = 0]$ $B_x = 0$

$[\Sigma F_y = 0]$ $-1\,kN - 5\,kN + B_y = 0$

$B_y = 6\,kN \uparrow$

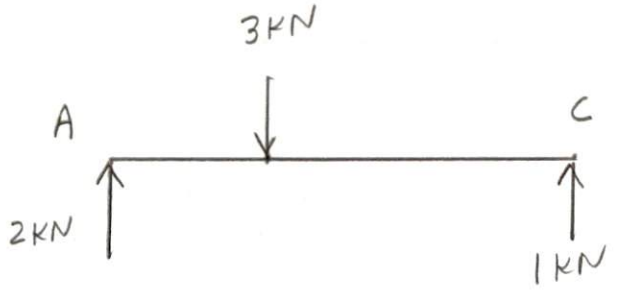
$[\Sigma M_B = 0]$ $1\,kN\,(0.4m) + 5\,kN\,(0.2m) - M = 0$

$M = 1.4\,kN \cdot M$ ↻

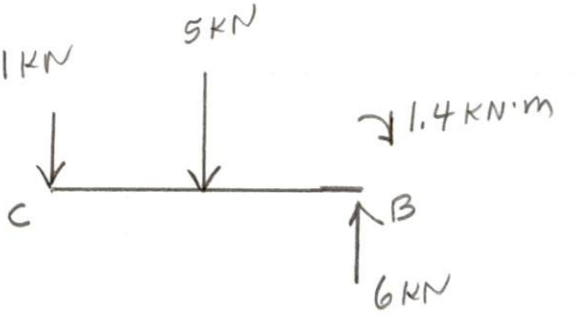
Guessed correctly

$M = -1.4\,kN \cdot M$ (cw) ↻

Summarize



member AC



member BC

Both members are in equilibrium ✓