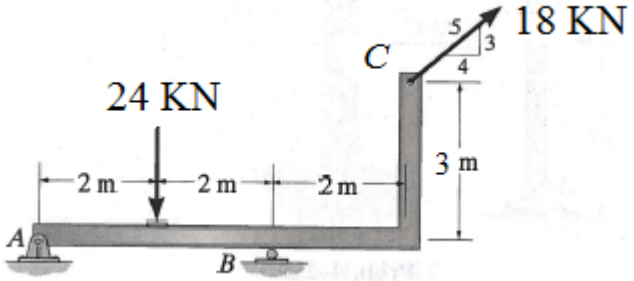
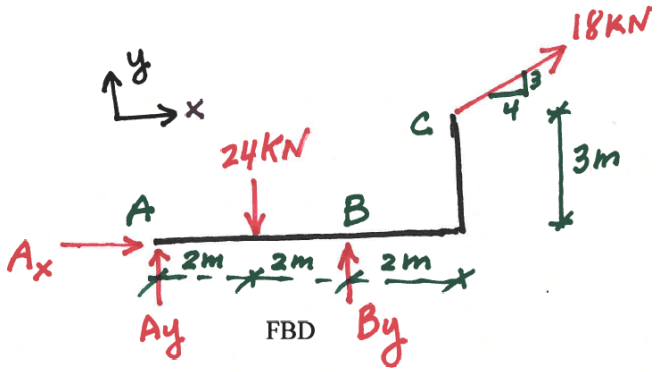
Problem 4

a. For the loadings shown, draw the complete free body diagram of member *ABC* supported by a pin at *A* and a roller at *B*.





FBD

b. Determine the reactions at supports A and B.

$\circlearrowleft \Sigma M_A = 0 = 24\,(2) - B_y\,(4) + 18\left(\frac{4}{5}\right)(3) - 18\left(\frac{3}{5}\right)(6)$ (KN, m)

$0 = 48 - 4B_y + 43.2 - 64.8$

$4B_y = 26.4 \Rightarrow B_y = 6.60\ \text{KN} \uparrow$

$+\uparrow \Sigma F_y = 0 = A_y - 24 + 6.60 + 18\left(\frac{3}{5}\right)$

$A_y = 24 - 6.60 - 10.8 \Rightarrow A_y = 6.60\ \text{KN} \uparrow$

$+\rightarrow \Sigma F_x = 0 = A_x + 18\left(\frac{4}{5}\right) \Rightarrow A_x = -14.4 = 14.40\ \text{KN} \leftarrow$

Check $\circlearrowleft \Sigma M_B = 0 = A_y\,(4) - 24\,(2) + 18\left(\frac{4}{5}\right)(3) - 18\left(\frac{3}{5}\right)(2)$ (KN, m)

$4A_y = 48 - 43.2 + 21.6 = 26.4$

$A_y = 6.60\ \text{KN} \uparrow$ same answer O.K.

ANSWER:

$A_x = 14.40\ \text{KN} \leftarrow \quad A_y = 6.60\ \text{KN} \uparrow \quad B_y = 6.60\ \text{KN} \uparrow$