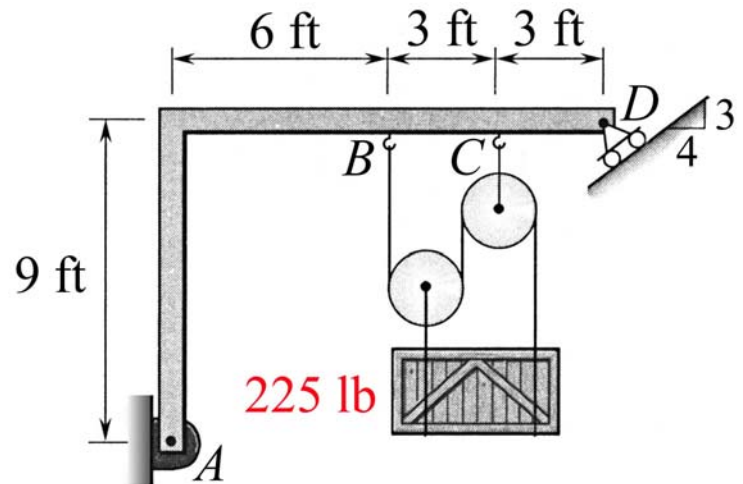


MEEG 2003 Quiz #5.m13

A frame carrying a crate of 225 lb is shown. Determine (a) the tension F_1 in the cable at B , (b) the tension F_2 in the cable at C , (c) the reaction force \mathbf{A} at the hinge support A , (d) the reaction force \mathbf{F}_D at the roller support D .



FBD of crate & left pulley:

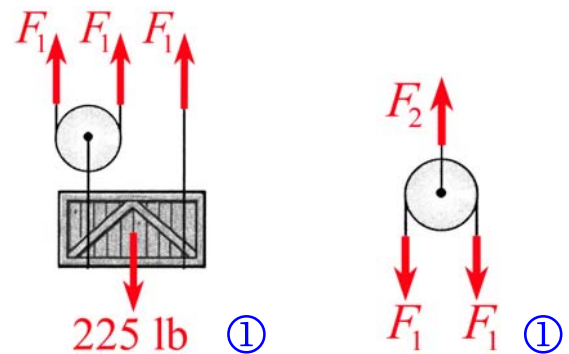
$$+\uparrow \Sigma F_y = 0: 3F_1 - 225 = 0$$

$$\therefore F_1 = 75 \text{ lb} \quad \textcircled{1}$$

FBD of pulley below C :

$$+\uparrow \Sigma F_y = 0: F_2 - 2F_1 = 0$$

$$\therefore F_2 = 150 \text{ lb} \quad \textcircled{1}$$



FBD of member $ABCD$:

$$+\circlearrowleft \Sigma M_A = 0:$$

$$9\left(\frac{3}{5}F_D\right) + 12\left(\frac{4}{5}F_D\right) - 9F_2 - 6F_1 = 0$$

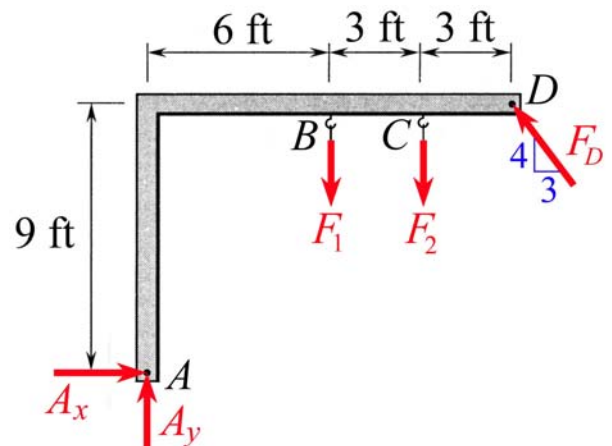
$$F_D = 120 \therefore \mathbf{F}_D = -72\mathbf{i} + 96\mathbf{j} \text{ lb} \quad \textcircled{2}$$

$$\pm \rightarrow \Sigma F_x = 0: A_x - \frac{3}{5}F_D = 0$$

$$+\uparrow \Sigma F_y = 0: A_y - F_1 - F_2 + \frac{4}{5}F_D = 0$$

$$A_x = 72 \quad A_y = 129$$

$$\therefore \mathbf{A} = 72\mathbf{i} + 129\mathbf{j} \text{ lb} \quad \textcircled{2}$$



$\textcircled{2}$