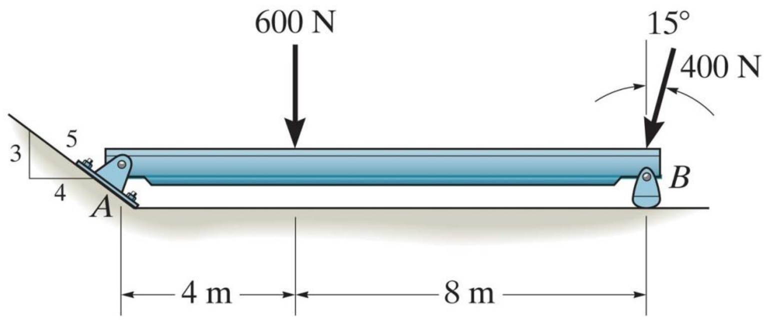
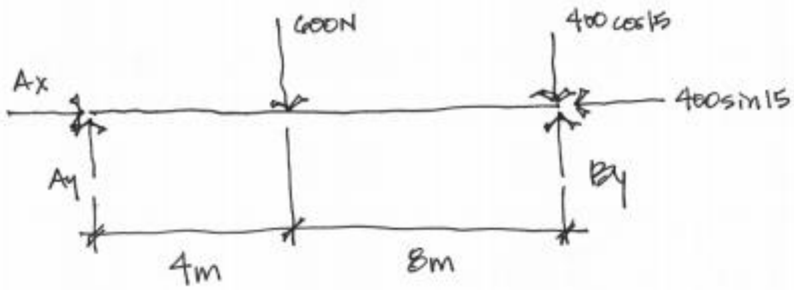


Draw the free body diagram and calculate the external reactions at A (pin) and B (rocker). Neglect the thickness of the beam. Show directional arrows in your answer.

FBD:



$$+\circlearrowleft \Sigma M_A = 0 = -600(4) - 400\cos 15\,(12) + B_y(12)$$

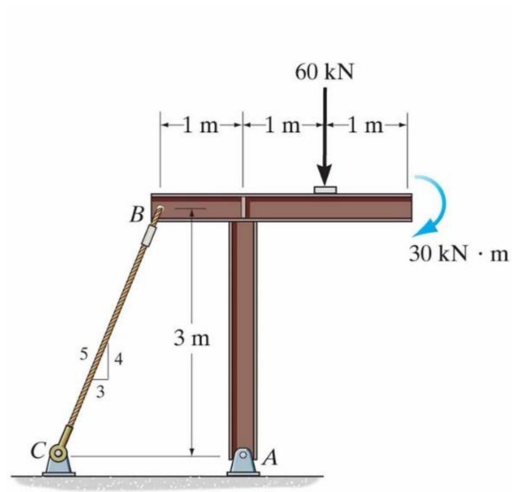
$$\boxed{B_y = 586.37 \text{ N} \uparrow}$$

$$\uparrow \Sigma F_y = 0 = A_y - 600 - 400\cos 15 + 586.37$$

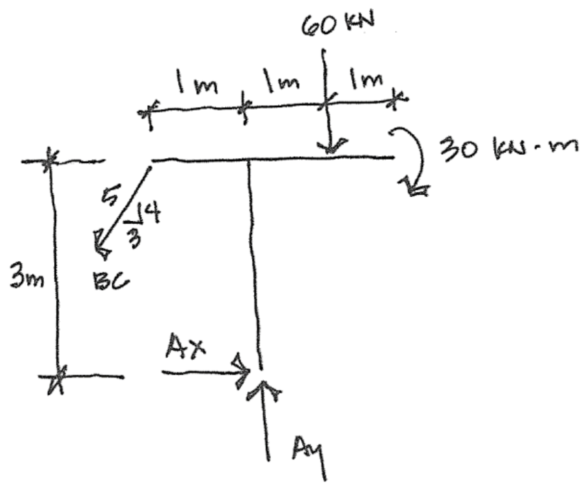
$$\boxed{A_y = 400 \text{ N} \uparrow}$$

$$\rightarrow \Sigma F_x = 0 = A_x - 400\sin 15$$

$$\boxed{A_x = 103.53 \text{ N} \rightarrow}$$



Draw the free-body diagram and calculate the external support reactions at the pin and the tension in cable BC.



$$+\circlearrowleft \Sigma M_A = 0 = \frac{3}{5} BC(3) + \frac{4}{5} BC(1) - 60(1) - 30$$

$$2.6\, BC = 90$$

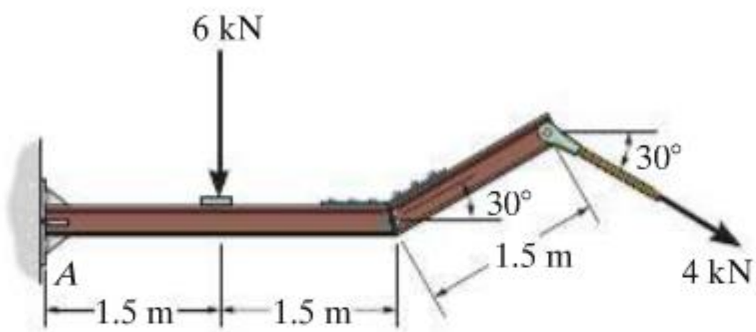
$$\boxed{BC = 34.6 \text{ KN (T)}}$$

$$+\uparrow \Sigma F_y = 0 = A_y - \frac{4}{5}(34.6) - 60$$

$$\boxed{A_y = 87.68 \text{ KN} \uparrow}$$

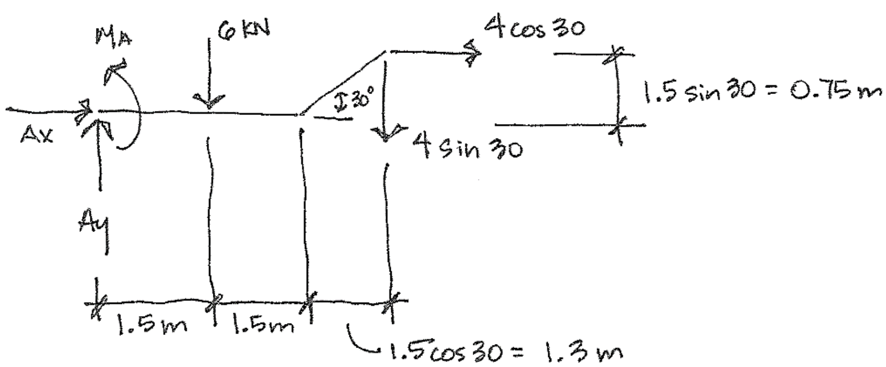
$$\xrightarrow{+} \Sigma F_x = 0 = -\frac{3}{5}(34.6) + A_x$$

$$\boxed{A_x = 20.76 \text{ KN} \rightarrow}$$



Determine the components of reaction at the fixed support at A. Indicate direction in your answer with arrows.

FBD:



$\xrightarrow{+} \Sigma F_x = 0 = A_x + 4\cos 30$

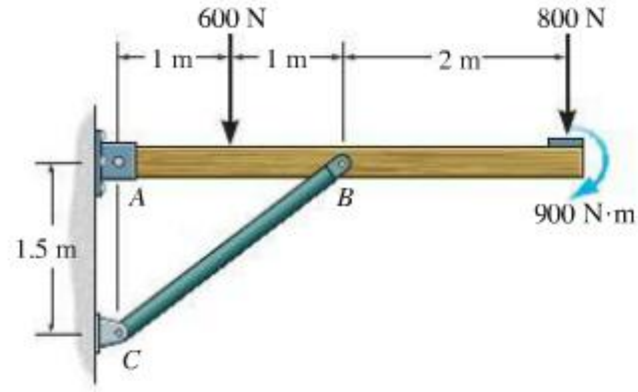
$A_x = -3.46$ $\quad \boxed{A_x = 3.46 \text{ kN} \leftarrow}$

$+\uparrow \Sigma F_y = 0 = A_y - 6 - 4\sin 30$

$A_y = 8$ $\quad \boxed{A_y = 8 \text{ kN} \uparrow}$

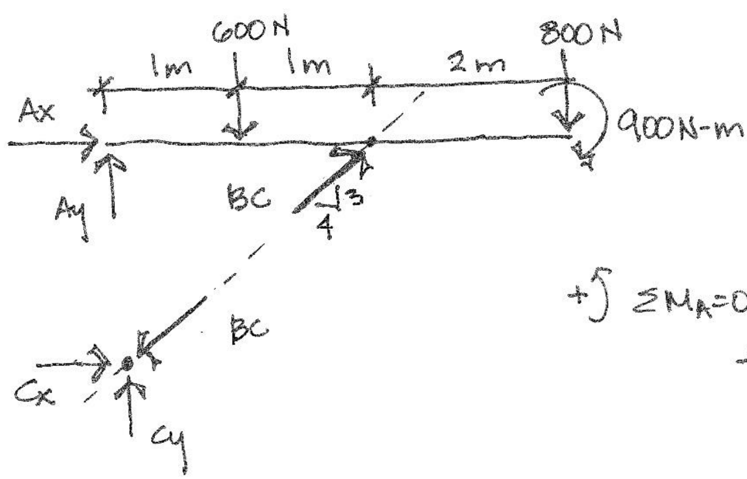
$+\circlearrowleft \Sigma M_A = 0 = M_A - 6(1.5) - 4\sin 30(4.3) - 4\cos 30(0.75)$

$\boxed{M_A = 20.2 \text{ kN-m} \circlearrowleft}$



Draw the free-body diagram and calculate the external support reactions at the pin at A and the pin at B utilizing any 2-force members.

FBD:



* BC IS A 2-FORCE MEMBER

$$+\circlearrowleft \Sigma M_A = 0 = -600(1) - 800(4) + \tfrac{3}{5}BC(2) - 900$$

$$BC = 3916.7 \text{ N (C)}$$

@ POINT C:

$$\overset{+}{\rightarrow} \Sigma F_x = 0 = C_x - \tfrac{4}{5}(3917)$$

$$\boxed{C_x = 3133.6 \text{ N} \rightarrow}$$

$$+\uparrow \Sigma F_y = 0 = C_y - \tfrac{3}{5}(3917)$$

$$\boxed{C_y = 2350.2 \text{ N} \uparrow}$$

$$+\uparrow \Sigma F_y = 0 = A_y - 600 - 800 + \tfrac{3}{5}(3917)$$

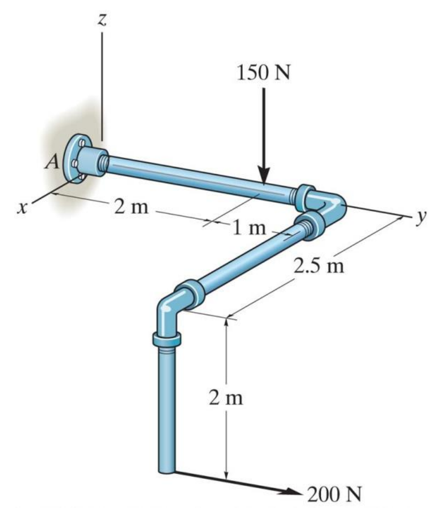
$$A_y = -950.2$$

$$\boxed{A_y = 950.2 \text{ N} \downarrow}$$

$$\overset{+}{\rightarrow} \Sigma F_x = 0 = A_x + \tfrac{4}{5}(3917)$$

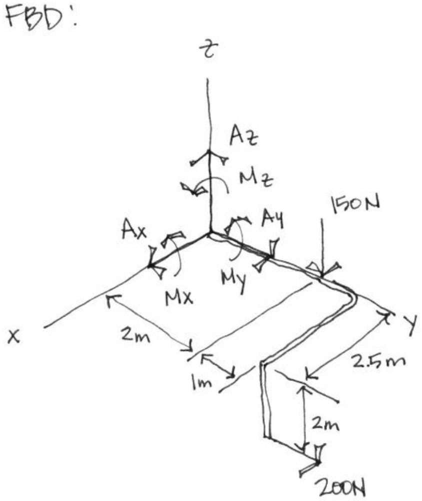
$$A_x = -3133.6$$

$$\boxed{A_x = 3133.6 \text{ N} \leftarrow}$$



Draw the free-body diagram and calculate the external support reactions at the fixed support at A. The 150 N force is parallel to the z axis and the 200 N force is parallel to the y axis. Assume right hand rule as positive sign convention.

FBD:



$\Sigma F_x = 0 = A_x$ $\boxed{A_x = 0}$

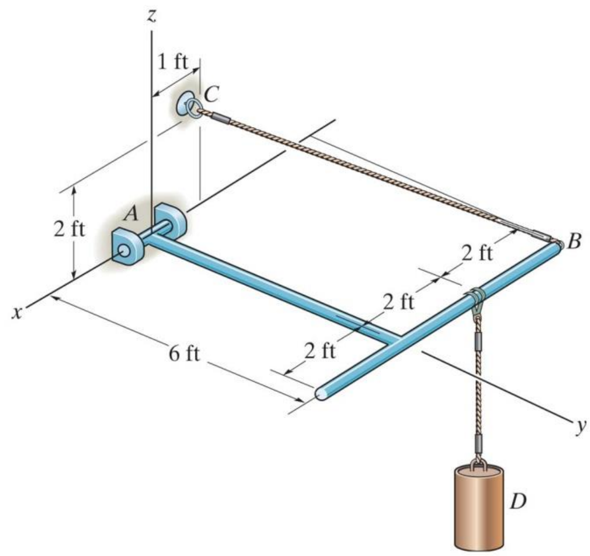
$\Sigma F_y = 0 = A_y + 200$ $\boxed{A_y = -200N}$

$\Sigma F_z = 0 = A_z - 150$ $\boxed{A_z = 150\ N}$

$\Sigma M_x = 0 = M_x - 150(2) + 200(2)$ $\boxed{M_x = -100\ N\text{-}m}$

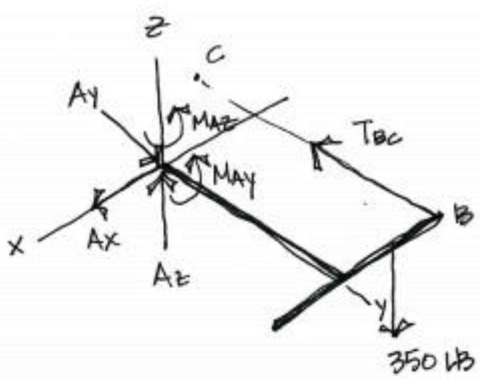
$\Sigma M_y = 0 = M_y$ $\boxed{M_y = 0}$

$\Sigma M_z = 0 = 200(2.5) + M_z$ $\boxed{M_z = -500\ N\text{-}m}$



The member is supported by a pin at A and cable BC. If the weight of the cylinder is 350 lb, determine the external support reactions at A and the force in cable BC. Draw the free-body diagram and assume right hand rule positive sign convention.

FBD:



COORDINATES:

$B(-4, 6, 0)$

$C(-1, 0, 2)$

$\bar{r}_{BC} = 3i - 6j + 2k$

$|r_{BC}| = \sqrt{3^2 + (-6)^2 + (2)^2} = 7$

$\bar{u}_{BC} = \frac{3}{7}i - \frac{6}{7}j + \frac{2}{7}k$

EQUATIONS:

① $\Sigma F_x = 0 = A_x + \frac{3}{7} T_{BC}$

② $\Sigma F_y = 0 = A_y - \frac{6}{7} T_{BC}$

③ $\Sigma F_z = 0 = A_z + \frac{2}{7} T_{BC} - 350$

④ $\Sigma M_x = 0 = -350(6) + \frac{2}{7} T_{BC}(6)$

$\boxed{T_{BC} = 1225 \text{ LB}}$

⑤ $\Sigma M_y = 0 = M_{Ay} - 350(2) + \frac{2}{7}(1225)(4)$

$\boxed{M_{Ay} = -700 \text{ LB-FT}}$

⑥ $\Sigma M_z = 0 = M_{Az} - \frac{3}{7}(1225)(6) + \frac{6}{7}(1225)(4)$

$\boxed{M_{Az} = -1050 \text{ LB-FT}}$

SOLVING ①, ②, & ③ W/ $T_{BC} = 1225$ LB:

$\boxed{A_x = -525 \text{ LB}}$ $\boxed{A_y = 1050 \text{ LB}}$

$\boxed{A_z = 0}$