ENGR-2050
E.M. - STATICS

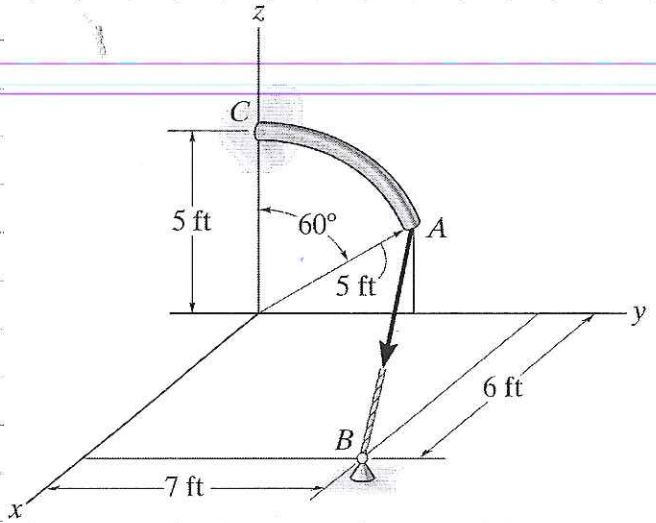
NAME

DATE

SOLUTION

QUIZ 004

GIVEN: THE CURVED ROD HAS A RADIUS OF *5 ft*. IF A FORCE OF *10 lb* AT THE END AS SHOWN (*AB*), DETERMINE THE MOMENT OF THIS FORCE ABOUT THE ORIGIN. *A* LIES ON THE *yz* PLANE.



REQUIRED:

SOLUTION:

$A(0,\ 5\cos 30^\circ,\ 5\sin 30^\circ)$

$\vec{r}_{OA} = \{0\,\hat{i} + 4.33\,\hat{j} + 2.5\,\hat{k}\}^{FT}$

$\vec{AB} = \{6\,\hat{i} + 2.67\,\hat{j} - 2.5\,\hat{k}\}^{FT}$ $\quad AB = 7.027^{FT}$

$\hat{e}_{AB} = \{0.854\,\hat{i} + 0.3800\,\hat{j} - 0.3558\,\hat{k}\}$

$\vec{F}_{AB} = 10\not{0}^{LB}\ \hat{e}_{AB} = \{8.54\,\hat{i} + 3.80\,\hat{j} - 3.56\,\hat{k}\}^{LB}$

$$M_O = \vec{r}_{OA} \times \vec{F}_{AB} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 4.33 & 2.5 \\ 8.54 & 3.80 & -3.56 \end{vmatrix}$$

$$M_O = \{-24.9\,\hat{i} + 21.3\,\hat{j} - 36.9\,\hat{k}\}^{LB\text{-}FT}$$