To get the FORCE as a VECTOR:

$$\vec{F}_{AB} = F\lambda_{AB} = 8^{N.}\left[-0.512\hat{i} - 0.768\hat{j} - 0.384\hat{k}\right]$$
$$= -4.096\hat{i} - 6.144\hat{j} - 3.072\hat{k}$$

MOMENT ABOUT PT. C: $\vec{M}_C = \vec{r}_{CA} \times \vec{F}_{AB}$

$$\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 3 & 9 \\ -4.1 & -6.144 & -3.072 \end{vmatrix} = \hat{i}\left[3(-3.072) - 9(-6.144)\right] - \hat{j}\left[0 - 9(-4.1)\right] + \hat{k}\left[0 - 3(-4.1)\right]$$

$$\vec{M}_C = 46.08\hat{i} - 36.864\hat{j} + 12.288\hat{k} \quad \text{N-m}$$
$$\doteq 46.1\hat{i} - 36.9\hat{j} + 12.3\hat{k}$$

Now determine the UNIT VECTOR for Line $\overline{CD}$

end pt. D (4, 1, 2)
− start pt. C (0, 3, −4)

$$\overline{CD} = 4\hat{i} - 2\hat{j} + 6\hat{k} \quad \therefore \sqrt{4^2 + 2^2 + 6^2} = 7.483$$

$$\lambda_{CD} = \frac{4}{7.483}\hat{i} - \frac{2}{7.483}\hat{j} + \frac{6}{7.483}\hat{k} = 0.535\hat{i} - 0.267\hat{j} + 0.802\hat{k}$$

Therefore, $\vec{M}_{\text{Line } \overline{CD}} = \left(\vec{M}_{pt.C} \cdot \lambda_{CD}\right)\lambda_{CD}$

$$= \left[(46.1\hat{i} - 36.9\hat{j} + 12.3\hat{k}) \cdot (0.535\hat{i} - 0.267\hat{j} + 0.802\hat{k})\right]\lambda_{CD}$$
$$= \left[(46.1)(0.535) + (-36.9)(-0.267) + (12.3)(0.802)\right]\lambda_{CD}$$
$$= \left[44.38 \text{ N-m}\right](0.535\hat{i} - 0.267\hat{j} + 0.802\hat{k})$$

$$= 23.74\hat{i} - 11.85\hat{j} + 35.59\hat{k}$$ VECTOR-FORM

$$\boxed{M_{\overline{CD}} = 44.38 \text{ N-m}}$$ SCALAR MAGNITUDE.