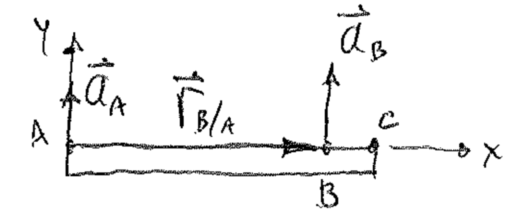
PROB. 15-107



$\vec{a}_A = (12)\hat{j}\ \frac{ft}{s^2}$, $\vec{a}_B = (5)\hat{j}\ \frac{ft}{s^2}$

a) FIND α : ASSUME $\omega = 0$

$$\vec{a}_B = \vec{a}_A + \alpha\hat{k}\times\vec{r}_{B/A} - \overset{0}{\cancel{\omega^2}}\,\vec{r}_{B/A}$$

$$\alpha\hat{k}\times\vec{r}_{B/A} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 0 & \alpha \\ 9 & 0 & 0 \end{vmatrix}$$

$$= -[0-(\alpha)(9)]\hat{j} = (9\alpha)\hat{j}$$

$$(5)\hat{j} = (12)\hat{j} + (9\alpha)\hat{j} \Rightarrow 5 = 12 + 9\alpha,\ \alpha = -\frac{7}{9}\ \frac{RAD}{s^2}$$

$$\boxed{\alpha = (-0.7778)\hat{k}\ \frac{RAD}{s^2}}$$

b) FIND $\vec{a}_C$

$$\vec{a}_C = \vec{a}_B + \alpha\hat{k}\times\vec{r}_{C/B}$$

$$\alpha\hat{k}\times\vec{r}_{C/B} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 0 & -\frac{7}{9} \\ 1 & 0 & 0 \end{vmatrix}$$

$$= -[0-(-\tfrac{7}{9})(1)]\hat{j} = (-\tfrac{7}{9})\hat{j}$$

$$\vec{a}_C = (5)\hat{j} + (-\tfrac{7}{9})\hat{j} = (\tfrac{38}{9})\hat{j} \boxed{= (4.222)\hat{j}\ \frac{ft}{s^2}}$$