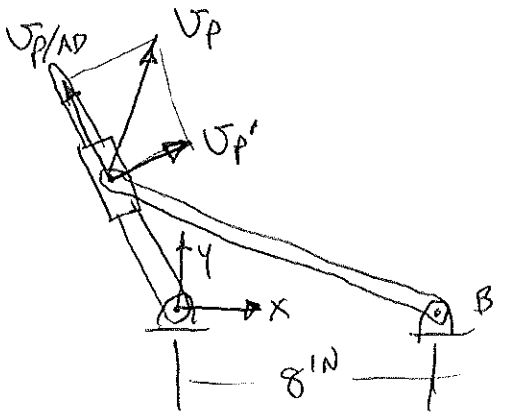
PROB. 15-153



$v_0 = 9 \frac{IN}{s}$ ↗ 60°

FIND W_A, W_B

$\vec{v}_P = \vec{v}_{P'} + \vec{v}_{P/AD}$

$\vec{r}_{AP} = (-2.13)\hat{i} + (3.687)\hat{j}$ IN

$\vec{r}_{BP} = (-10.13)\hat{i} + (3.687)\hat{j}$ IN

$$\vec{v}_P = \cancel{\vec{v}_B}^{\,0} + W_B\hat{k} \times \vec{r}_{BP} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 0 & W_B \\ -10.13 & 3.687 & 0 \end{vmatrix}$$

$$= [0 - (W_B)(3.687)]\hat{i} - [0 - (W_B)(-10.13)]\hat{j}$$

$$\vec{v}_P = (-3.687 W_B)\hat{i} + (-10.13 W_B)\hat{j} \ \frac{IN}{s}$$

$$\vec{v}_{P'} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 0 & W_A \\ -2.13 & 3.687 & 0 \end{vmatrix}$$

$$= [0 - (W_A)(3.687)]\hat{i} - [0 - (W_A)(-2.13)]\hat{j}$$

$$\vec{v}_P' = (-3.687 W_A)\hat{i} + (-2.13 W_A)\hat{j} \ \frac{IN}{s}$$

$$\vec{v}_0 = \vec{v}_{P/AD} = (-9 \cdot \cos 60°)\hat{i} + (9 \cdot \sin 60°)\hat{j}$$

$$\vec{v}_0 = (-4.5)\hat{i} + (7.794)\hat{j} \ \frac{IN}{s}$$

PROB. 15-153 CONT.

$$\vec{v}_P = \vec{v}_{P'} + \vec{v}_O$$

$$(-3.687\,\omega_B)\hat{i} + (-10.13\,\omega_B)\hat{j} = (-3.687\,\omega_A)\hat{i}$$

$$+(-2.13\,\omega_A)\hat{j} + (-4.5)\hat{i} + (7.794)\hat{j}$$

X-DIRECTION: $-3.687\,\omega_B = -3.687\,\omega_A - 4.5$

$$\omega_B = \omega_A + 1.221$$

Y-DIRECTION: $-10.13\,\omega_B = -2.13\,\omega_A + 7.794$

$$-10.13(\omega_A + 1.221) = -2.13\,\omega_A + 7.794$$

$$-10.13\,\omega_A - 12.36 = -2.13\,\omega_A + 7.794$$

$$8\,\omega_A = -20.15 \Rightarrow \boxed{\omega_A = -2.519 \ \frac{\text{RAD}}{\text{S}} \ \text{↻}}$$

$$\omega_B = -2.519 + 1.221 \ \boxed{= -1.298 \ \frac{\text{RAD}}{\text{S}} \ \text{↻}}$$