PROB. 15-45

FIND v_A , POINT WHERE $v=0$

$$\vec{v}_A = \vec{v}_B + \omega\hat{k} \times \vec{r}_{A/B}$$

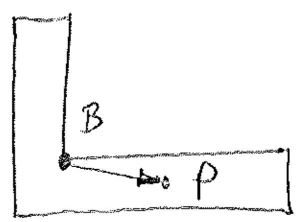
$$(v_{Ax})\hat{i} + (v_{Ay})\hat{j} = (v_{Bx})\hat{i} + (v_{By})\hat{j} + (-4\omega)\hat{i} + (-2\omega)\hat{j}$$

Y-DIRECTION:

$$v_{Ay} = v_{By} - 2\omega = 0 - 2(-4) = 8 \tfrac{IN}{SEC}$$

$$\boxed{\vec{v}_A = (12)\hat{i} + (8)\hat{j} \ \tfrac{IN}{SEC}}$$

CHOOSE ARBITRARY POINT $P(x,y)$



$B(2,2)$, $\vec{v}_B = (-4)\hat{i} \ \tfrac{IN}{SEC}$

$$\vec{v}_P = \vec{v}_B + \vec{v}_{P/B} = \vec{v}_B + \omega\hat{k} \times \vec{r}_{P/B}$$

FIND POSITION VECTOR $\vec{r}_{P/B}$:

$$dx = x_P - x_B = x - 2 \ ; \quad dy = y_P - y_B = y - 2$$

$$\vec{r}_{P/B} = (x-2)\hat{i} + (y-2)\hat{j} \ \text{IN}$$

$$\omega\hat{k} \times \vec{r}_{P/B} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 0 & \omega \\ (x-2) & (y-2) & 0 \end{vmatrix}$$

$$= [0 - (\omega)(y-2)]\hat{i} - [0 - (\omega)(x-2)]\hat{j}$$

$$= [\omega(2-y)]\hat{i} + [\omega(x-2)]\hat{j}$$

PROB. 15-45 CONT.

$$\vec{v}_P = \vec{v}_B + \omega \hat{k} \times \vec{r}_{P/B}$$

$$(v_{Px})\hat{i} + (v_{Py})\hat{j} = (v_{Bx})\hat{i} + (v_{By})\hat{j} + [\omega(2-y)]\hat{i} + [\omega(x-2)]\hat{j}$$

X-DIRECTION:

$$v_{Px} = v_{Bx} + \omega(2-y)$$

$$0 = (-4) + (-4)(2-y) \Rightarrow \boxed{y = 3^{\text{IN}}}$$

Y-DIRECTION:

$$v_{Py} = v_{By} + \omega(x-2)$$

$$0 = 0 + (-4)(x-2) \Rightarrow \boxed{x = 2^{\text{IN}}}$$