

PROB. 11-118

$$|\vec{v}_A| = 10 \frac{m}{s}, \theta_A = 10^\circ; |\vec{v}_B| = 14 \frac{m}{s}, \theta_B = 25^\circ$$

FIND $\vec{v}_{A/B}$

$$(v_x)_A = 10 \cos 10^\circ = 9.848 \frac{m}{s}, (v_y)_A = -10 \sin 10^\circ = -1.736 \frac{m}{s}$$

$$(v_x)_B = 14 \cos 25^\circ = 12.69 \frac{m}{s}, (v_y)_B = -14 \sin 25^\circ = -5.917 \frac{m}{s}$$

$$\vec{v}_A = (9.848)\hat{i} + (-1.736)\hat{j} \frac{m}{s}$$

$$\vec{v}_B = (12.69)\hat{i} + (-5.917)\hat{j} \frac{m}{s}$$

$$\vec{v}_A = \vec{v}_B + \vec{v}_{A/B}, \quad \vec{v}_{A/B} = \vec{v}_A - \vec{v}_B$$

$$\vec{v}_{A/B} = (9.848)\hat{i} + (-1.736)\hat{j} - [(12.69)\hat{i} + (-5.917)\hat{j}]$$

$$\vec{v}_{A/B} = (-2.842)\hat{i} + (4.181)\hat{j}$$

$$|\vec{v}_{A/B}| = 5.055 \frac{m}{s} \quad \theta = \tan^{-1}\left(\frac{4.181}{-2.842}\right) = -55.79^\circ$$

$$\theta = 180 - 55.79 = 124.2^\circ$$

