PROB. 13.-171

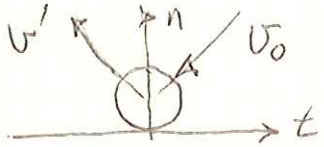
$v_0 = 16 \frac{ft}{s}$, $\theta = 60°$, $e = 0.6$, $\vec{v}_B = (-v_B)\hat{i}$

a) FIND h AND d

$(\vec{v}_0) = (-16 \cdot \cos 60°)\hat{i} + (-16 \cdot \sin 60°)\hat{j} = (-8)\hat{i} + (-13.85)\hat{j}\ \frac{ft}{s}$

TANGENT DIRECTION:

$(v')_t = (v)_t = (-8)\hat{i}\ \frac{ft}{s}$



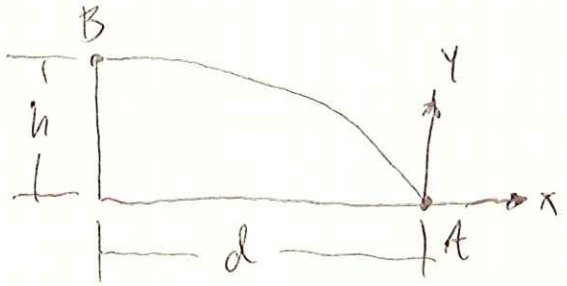
NORMAL DIRECTION: RESTITUTION

$-(v')_n = e(v)_n$

$(v')_n = -e(v)_n = -(0.6)(-13.85\ \frac{ft}{s}) = 8.314\ \frac{ft}{s}$

$(\vec{v}') = (-8)\hat{i} + (8.314)\hat{j}\ \frac{ft}{s}$

PROJECTILE MOTION:



$(x_1, y_1) = (0, 0)$

$(x_2, y_2) = (-d, h)$

$v_y = (v_y)_0 - gt$: AT POINT B, $v_y = 0$

$0 = (8.314\ \frac{ft}{s}) - (32.2\ \frac{ft}{s^2})t \Rightarrow t = 0.2582^s$

$x = (v_x)_0 \cdot t$: $(-d) = (-8\ \frac{ft}{s})(0.2582^s) \Rightarrow \boxed{d = 2.065\ ft}$

$y = (v_y)_0 \cdot t - \frac{1}{2} g t^2$

$h = (8.314\ \frac{ft}{s})(0.2582^s) - \frac{1}{2}(32.2\ \frac{ft}{s^2})(0.2582^s)^2 \boxed{= 1.073\ ft}$

b) FIND VELOCITY AT B: $\boxed{v_B = (v_x)_0 = (-8)\hat{i}\ \frac{ft}{s}}$