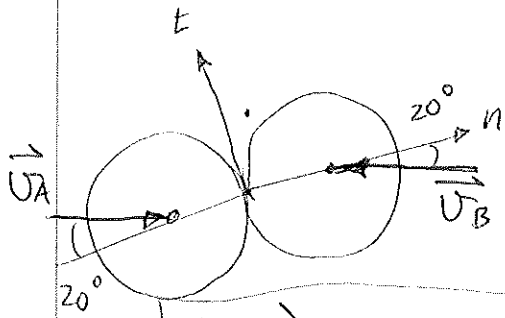


PROB. 13-166

$v_A = v_B = 3 \frac{m}{s}$, $m_A = m_B$, $e = 1$, FIND v_A' , v_B'



t-AXIS: MOMENTUM OF EACH MASS IS CONSERVED

$$(v_A')_t = (v_A)_t = -v_A \sin 20^\circ = -3 \cdot \sin 20^\circ$$

$$(v_A')_t = -1.026 \frac{m}{s}$$

$$(v_B')_t = (v_B)_t = v_B \cdot \sin 20^\circ = 3 \cdot \sin 20^\circ = 1.026 \frac{m}{s}$$

n-AXIS: CONSERVE MOMENTUM OF SYSTEM

$$m_A (v_A)_n + m_B (v_B)_n = m_A (v_A')_n + m_B (v_B')_n ; m_A = m_B$$

$$(v_A')_n = (v_A)_n + (v_B)_n - (v_B')_n$$

$$(v_A)_n = v_A \cdot \cos 20^\circ = 3 \cos 20^\circ = 2.819 \frac{m}{s}$$

$$(v_B)_n = -v_B \cdot \cos 20^\circ = -2.819 \frac{m}{s}$$

$$(v_A')_n = (2.819) + (-2.819) - (v_B')_n$$

$$(v_A')_n = -(v_B')_n$$

RESTITUTION:

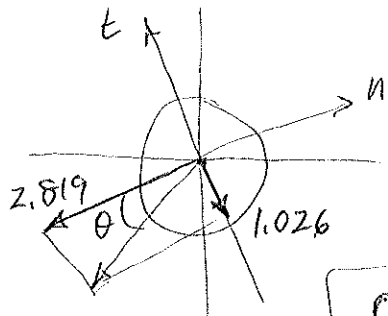
$$(v_B')_n - (v_A')_n = e [(v_A)_n - (v_B)_n]$$

$$(v_B')_n - [-(v_B')_n] = (1) [(2.819 \frac{m}{s}) - (-2.819 \frac{m}{s})]$$

$$(v_B')_n = 2.819 \frac{m}{s} , (v_A')_n = -2.819 \frac{m}{s}$$

PROB. 13-166 CONT.

PUCK A:



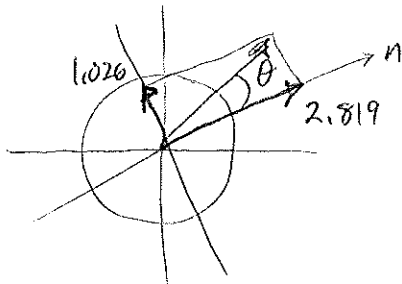
$$(v'_A)_t = -1.026, (v'_A)_n = -2.819$$

$$v'_A = 3.0 \frac{m}{s}$$

$$\theta = \tan^{-1}\left(\frac{1.026}{2.819}\right) = 20^\circ$$

$$\theta_A = 180 + 20 + 20 = 220^\circ$$

PUCK B:



$$(v'_B)_t = 1.026, (v'_B)_n = 2.819$$

$$v'_B = 3.0 \frac{m}{s}$$

$$\theta = 20^\circ$$

$$\theta_B = 40^\circ$$