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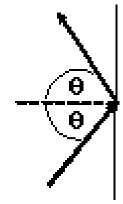

$m_{ball} := 0.060kg$ $\quad V_0 := 25\frac{m}{s}$ $\quad \theta := 45deg$

rebounds at same speed $V_F := V_0$ $\quad \theta := 45deg$

Find **Impulse**

SOLUTION

USE **IMPUSLE - MOMENTUM** THEOREM IN **2-D**

$$\overrightarrow{Impulse_{NET}} = \overrightarrow{\Delta P} \quad \Rightarrow \quad \begin{matrix} Impulse_{NET\_X} = \Delta P_X \\ Impulse_{NET\_Y} = \Delta P_Y \end{matrix}$$

From the picture above $\quad V_{0X} := V_0 \cdot \cos(\theta) \quad V_{0Y} := V_0 \cdot \sin(\theta)$

$V_{FX} := -V_F \cdot \cos(\theta) \quad V_{FY} := V_F \cdot \sin(\theta)$

$\Delta P_X := m_{ball} \cdot V_{FX} - m_{ball} \cdot V_{0X} \qquad \Delta P_X = -2.121 \frac{kg \cdot m}{s}$

Therefor $\quad Impulse_{NET\_X} := \Delta P_X$

in the same fashion we obtain $Impulse_{NET\_Y}$

$\Delta P_Y := m_{ball} \cdot V_{FY} - m_{ball} \cdot V_{0Y} \qquad \Delta P_Y = 0 \frac{kg \cdot m}{s}$

Therefor $\quad Impulse_{NET\_Y} := \Delta P_Y$

NOW USE IN GENERAL $\quad Impulse_{NET} := \sqrt{Impulse_{NET\_X}^2 + Impulse_{NET\_Y}^2}$

$\theta_{net} = \tan^{-1}\left(\left|\frac{Impulse_{NET\_Y}}{Impulse_{NET\_X}}\right|\right)$ $\quad$ Quadrant = ?

IN OUR CASE only the"- X-component" survives and

$\left|Impulse_{NET}\right| = 2.121 N \cdot s$ $\quad \theta_{net} = 180DEG$ $\quad$ (negativeX – direction)