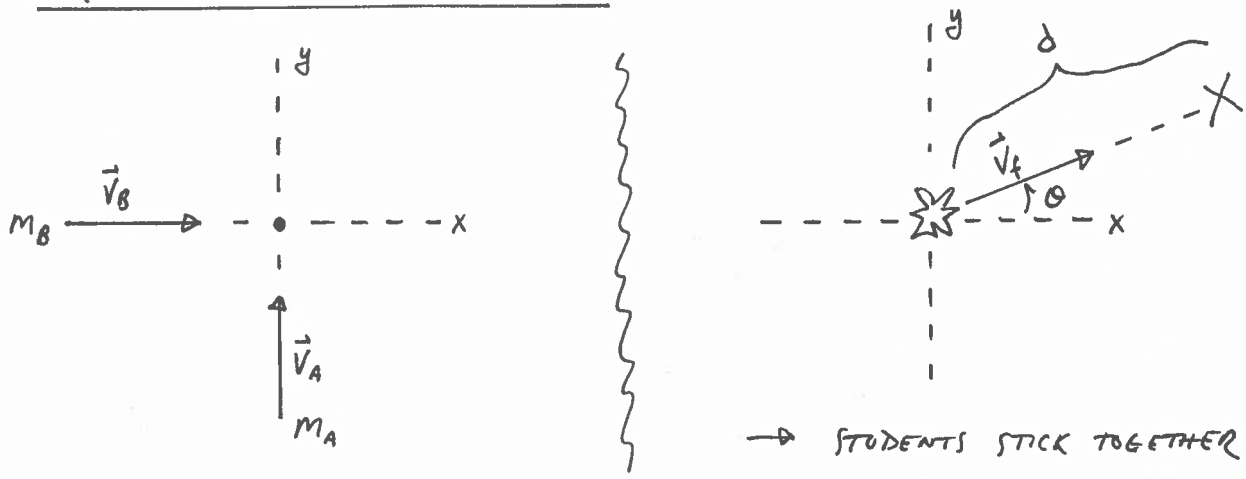
GROUP PROBLEM SOLUTION



BEFORE AFTER

1. CONSERVATION OF MOMENTUM

$$\vec{p}_i = \vec{p}_f \longrightarrow m_A\vec{V}_A + m_B\vec{V}_B = (m_A+m_B)\vec{V}_f$$

* DO BY COMPONENT:

$$x: \quad m_B V_B = (m_A+m_B) V_f \cos\theta$$

$$V_B = \frac{(m_A+m_B)}{m_B} V_f \cos\theta$$

$$y: \quad m_A V_A = (m_A+m_B) V_f \sin\theta$$

$$V_A = \frac{(m_A+m_B)}{m_A} V_f \sin\theta$$

* TO FIND V_A AND V_B, WE NEED V_f!

2. CONSERVATION OF ENERGY

(* SINCE COLLISION IS INELASTIC KE IS NOT CONSERVED)

AFTER COLLISION: CONSIDER WORK DONE BY FRICTION:

$$\Delta KE = W_f$$

$$-\frac{1}{2}(m_A+m_B)V_f^2 = -fd = -(m_A+m_B)g\mu_k d$$

$$V_f = \sqrt{2gd\mu_k}$$

THUS: $$V_A = \frac{(M_A + M_B)}{M_A}\sqrt{2gd\mu_K}\,\sin\theta$$

$$V_B = \frac{(M_A + M_B)}{M_B}\sqrt{2gd\mu_K}\,\cos\theta$$

FOR $M_A = 120$ lbs, $M_B = 150$ lbs } OK TO USE lbs AS MASSES ARE IN A RATIO SO UNITS CANCEL!

$\theta = 18°$

$d = 3.6$ ft

$\mu_K = 0.35$

$g = 32.2$ ft/s^2

WE FIND $V_A = 6.3$ ft/s $= 4.3$ mph

$V_B = 15.4$ ft/s $= 10.5$ mph

* BOB WILL BE SERVING DETENTION!