## 13

Big Jean Chretien, in a liberal mood, throws a carton of pepper spray at Lucien Bouchard. (Assault by pepper?). Lucien catches the carton, and hangs onto it, of course. (Has he ever returned a federal gift?). Since both men were initially standing at rest on a frictionless horizontal ice surface, this exchange causes them to *separate*. Each man has a mass of 100 kg, the carton has a mass of 20 kg, and the carton left Jean's hands with a horizontal velocity of <u>10 m/s relative to Jean's body</u>. Calculate the final relative separation speed between the two men. (Answer in m/s).

(a) 2.7   (b) 3.1   (c) 5.2   (d) 7.1   (e) 8.9

13.

Inelastic collision

$v_1 = 10 \text{m/s}$ $v_2 = 0$
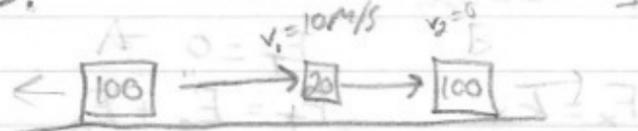
$\leftarrow$ [100] $\longrightarrow$ [20] $\longrightarrow$ [100]

To find the speed of B,
since they stick together $v_1' = v_2' = v'$

$v_1 = 10$ $v_2 = 0$ B v'

[20] $\rightarrow$ [100] $\Rightarrow$ [120] $\rightarrow$

$m_1 v_1 + m_2 v_2 = (m_1 + m_2) v'$
$(20)(10) + (100)(0) = (20 + 100) v'$
$200 = 120 v'$
$v' = 1.67 \text{ m/s}$

To find the speed of A

$v = 0$ $v_1' = ?$ $v_2' = 10$

[120] $\Rightarrow$ $\leftarrow$ [100] $\rightarrow$ [20]

A
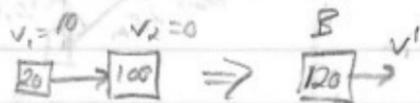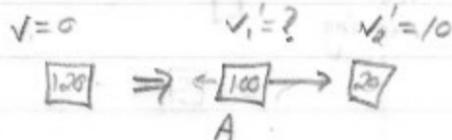
$P_T = P_T'$ $v_1 = v_2 = v = 0$
$0 = P_1' + P_2'$
$0 = m_1 v_1' + m_2 v_2'$
$m_1 v_1' = m_2 v_2'$
$00) v_1' = (20)(10)$
$v' = -2 \text{ m/s}$