

39. $m_A = 0.068 \text{ kg}$ $V_{A_i} = 0$ $V_{A_f} = 4 \text{ m/s}$

$m_B = 91 \text{ kg}$ $V_{B_i} = 0$ $V_{B_f} = ?$

$$\Sigma F_{\text{ext}} = 0$$

$$P_i = P_f$$

$$0 = m_A V_{A_f} + m_B V_{B_f}$$

$$0 = (0.068)(4) + 91 V_{B_f}$$

$$V_{B_f} = -0.003 \text{ m/s}$$

$$|V_f| = 0.003 \text{ m/s}$$

System: man and stone

Reference frame: Earth

40. $m_A = 4M$ $m_B = M$



$4300 \text{ km/hr} = V_{AB/E}$
(no need to convert - explained in class)

since $\Sigma F_{\text{ext}} = 0$ $P_0 = P_f$ $V_{B/E} = ?$ (after BANG)

$E = \text{earth}$ $(m_A + m_B) V_0 = m_A V_{A_f} + m_B V_{B_f}$

$(5M)(4300) = (4M)V_{A/E} + M V_{B/E}$

$V_{A/B} = -82 \text{ km/hr}$

$V_{A/E} = V_{A/B} + V_{B/E}$

$= -82 + V_{B/E}$

$21500 M = (4M)(-82 + V_{B/E}) + M V_{B/E}$

$21500 M = -328 M + 4M V_{B/E} + M V_{B/E}$

$$\frac{21828 M}{5M} = \frac{5M V_{B/E}}{5M}$$

$4366 \frac{\text{km}}{\text{hr}} = V_{B/E}$

45. $V_{3f} = ?$ $\Sigma F_{ext} = 0$ so $p_o = p_f$

$$(m_1 + m_2 + m_3)V_o = m_1 V_{1f} + m_2 V_{2f} + m_3 V_{3f}$$

$$(20)(200\hat{i}) = (10)(0\hat{i} + 100\hat{j}) + (4)(500\hat{i} + 0\hat{j})$$

$$4000\hat{i} + 0\hat{j} = (0\hat{i} + 1000\hat{j}) + (2000\hat{i} + 0\hat{j}) + (6V_x\hat{i} + 6V_y\hat{j})$$

$$4000 = 2000 + 6V_x \quad V_x = 1000 \text{ m/s}$$

$$0 = 1000 + 6V_y \quad V_y = -167 \text{ m/s}$$

$$V_c = (1000\hat{i} - 167\hat{j}) \text{ m/s}$$

b) $\Delta K = ?$

$$K_o = \frac{1}{2}(m)(V_o)^2 = \frac{1}{2}(20)(200)^2 = 400000 \text{ J}$$

$$K_f = \frac{1}{2}(10)(100)^2 = 50000 \text{ J}$$

$$+ \frac{1}{2}(4)(500)^2 = 500000 \text{ J}$$

$$+ \frac{1}{2}(6)(1015)^2 = 3090675 \text{ J}$$

$$K_f = 3640675$$

$$\Delta K = 3240675 \text{ J}$$