

B+2



10 ΦIII

$$m_1 = 100 \text{ kg} \\ m_2 = 3 m_1 \Rightarrow m_2 = 300 \text{ kg} \\ m_1 = 25 \text{ kg}$$

a) $v = 0$
 $v_2 = 150 \text{ cm/s}$
 $v_1 = j$

b) $v = 100 \text{ cm/s}$
 $v_2 = 150 \text{ cm/s}$
 $v_1' = j, v_2' = j$
 $|\Delta K| = j$

a)



$$\text{Add: } \vec{p}_{01} = \vec{p}_{02} \Rightarrow \vec{p}_1 + \vec{p}_2 = 0 \Rightarrow -\vec{p}_1 + \vec{p}_2 \Rightarrow$$

$$\Rightarrow p_1 = p_2 \Rightarrow m_1 v_1 = m_2 v_2 \Rightarrow$$

$$\Rightarrow 100 \cdot v_1 = 300 \cdot 150 \Rightarrow v_1 = 450 \text{ cm/s}$$

b)



Add

$$\vec{p}_{01} = \vec{p}_{02}$$

$$\vec{p}_1 = \vec{p}_2 + \vec{p}_2$$

$$\vec{p}_1 = -\vec{p}_1 + \vec{p}_2$$

$$m_1 v = -m_1 v_1 + m_2 v_2$$

$$100 \cdot 100 = -25 \cdot v_1 + 300 \cdot 150$$

$$400 = -v_1 + 450$$

$$v_1 = 450 - 400$$

$$v_1 = 50 \text{ cm/s}$$

(ii)



Add

$$\vec{p}_{01} = \vec{p}_{02}$$

$$\vec{p}_1 = \vec{p}_2 + \vec{p}_2$$

$$-\vec{p}_1 = -\vec{p}_1 + \vec{p}_2$$

$$-m_1 v = -m_1 v_1 + m_2 v_2$$

$$-100 \cdot 100 = -25 \cdot v_1 + 300 \cdot 150$$

$$-400 = -v_1 + 450$$

$$v_1 = 400 + 450$$

$$v_1 = 850 \text{ cm/s}$$

$$\Delta K = K_{\text{final}} - K_{\text{initial}} =$$

$$= \frac{1}{2} m_1 v_1^2 + \frac{1}{2} m_2 v_2^2 - \frac{1}{2} m_1 v^2 =$$

$$= \frac{1}{2} 25 \cdot 50^2 + \frac{1}{2} 300 \cdot 150^2 - \frac{1}{2} 100 \cdot 100^2 =$$

$$= \dots \text{ Joule}$$

$$|\Delta K| = \dots$$

$$\Delta K = K_{\text{final}} - K_{\text{initial}} =$$

$$= \frac{1}{2} m_1 v_1^2 + \frac{1}{2} m_2 v_2^2 - \frac{1}{2} m_1 v^2 =$$

$$= \frac{1}{2} 25 \cdot 850^2 + \frac{1}{2} 300 \cdot 150^2 - \frac{1}{2} 100 \cdot 100^2 =$$

$$= \dots \text{ Joule}$$

$$|\Delta K| = \dots$$

14 ΦIII



$$\text{Add: } \vec{p}_{01} = \vec{p}_{02} \Rightarrow \vec{p}_{01} = \vec{p}_1 + \vec{p}_2 \Rightarrow$$

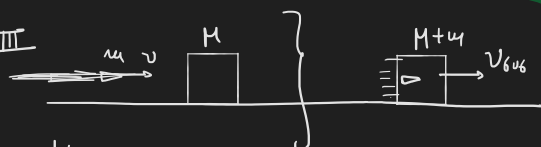
$$\Rightarrow p_{01} = p_1 \Rightarrow \cancel{m_1 v} = \cancel{m_1 v} \Rightarrow$$

$$\Rightarrow v_{01} = \frac{v}{2} \quad (1)$$

$$K_A = \frac{1}{2} m v^2$$

$$K_{01} = \frac{1}{2} m_1 v_{01}^2 \stackrel{(1)}{=} m_1 \left(\frac{v}{2} \right)^2 = m_1 \frac{v^2}{4} = \frac{1}{2} \left(\frac{1}{2} m_1 v^2 \right) = \frac{1}{2} K_A \rightarrow \text{Γ.}$$

15 ΦIII



$$K_{01} = \frac{1}{3} K_{02}$$

$$\frac{1}{2} (m_1 + m_2) v_{01}^2 = \frac{1}{3} \cdot \frac{1}{2} m_1 v^2 \Rightarrow$$

$$\Rightarrow 3(m_1 + m_2) v_{01}^2 = m_1 v^2 \quad (1)$$

$$\text{Add: } m_1 v + M'0 = (m_1 + M) v_{01} \Rightarrow v_{01} = \frac{m_1 v}{m_1 + M} \quad (2)$$

$$(1)/(2): 3(m_1 + M) \frac{m_1^2 v^2}{(m_1 + M)^2} = \frac{1}{3} m_1 v^2 \Rightarrow \frac{3 m_1}{m_1 + M} = 1 \Rightarrow$$

$$\Rightarrow 3m_1 = m_1 + M \Rightarrow 2m_1 = M \Rightarrow$$

$$\Rightarrow \frac{m_1}{M} = \frac{1}{2} \rightarrow \text{B.}$$