



$$\sum \vec{F}_{\text{ext}} = 0 \Rightarrow \frac{d\vec{p}}{dt} = 0 \Rightarrow \vec{p} = \text{Const}$$

$$p_i = p_f$$

$$m_1 v_0 = (m_1 + m_2) u$$

$$u = \frac{m_1}{m_1 + m_2} v_0$$

גובה המדרגות X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} X_{11} X_{12} X_{13} X_{14} X_{15} X_{16} X_{17} X_{18} X_{19} X_{20}

$$X_1 = \frac{v_0^2}{\mu_1 g (1 + \frac{m_1}{m_2})} - \frac{v_0^2}{2\mu_2 g (1 + \frac{m_1}{m_2})^2}$$

$$X_2 = \frac{m_1/m_2 v_0^2}{2\mu_2 g (1 + \frac{m_1}{m_2})^2}$$

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$$W = \Delta K = K_f - K_i$$

$$K_i = \frac{1}{2} m_1 v_0^2$$

$$K_f = \frac{1}{2} (m_1 + m_2) U^2$$

$$W_1 = -f_k X_1 = -\mu_k m_1 g X_1 = \frac{v_0^2 m_1}{2(1 + \frac{m_1}{m_2})^2} - \frac{v_0^2 m_1}{1 + \frac{m_1}{m_2}}$$

$$W_2 = f_k X_2 = \mu_k m_1 g X_2 = \frac{\frac{m_1^2}{m_2} v_0^2}{2(1 + \frac{m_1}{m_2})^2}$$

$$\frac{v_0^2 m_1}{2(1 + \frac{m_1}{m_2})^2} - \frac{v_0^2 m_1}{1 + \frac{m_1}{m_2}} + \frac{\frac{m_1^2}{m_2} v_0^2}{2(1 + \frac{m_1}{m_2})^2} = -\frac{1}{2} m_1 v_0^2 + \frac{1}{2} (m_1 + m_2) U^2$$

$$\frac{v_0^2 m_1}{2(1 + \frac{m_1}{m_2})^2} \left(1 + \frac{m_1}{m_2}\right) - \frac{v_0^2 m_1}{1 + \frac{m_1}{m_2}} = -\frac{1}{2} m_1 v_0^2 + \frac{1}{2} (m_1 + m_2) U^2$$

$$\frac{v_0^2 m_1}{2(1 + \frac{m_1}{m_2})} - \frac{v_0^2 m_1}{1 + \frac{m_1}{m_2}} = -\frac{1}{2} m_1 v_0^2 + \frac{1}{2} (m_1 + m_2) U^2$$

$$\frac{1}{2} m_1 v_0^2 - \frac{v_0^2 m_1}{2(1 + \frac{m_1}{m_2})} = \frac{1}{2} (m_1 + m_2) U^2$$

$$U^2 = v_0^2 \frac{m_1 - \frac{m_1 m_2}{m_1 + m_2}}{m_1 + m_2} = v_0^2 \frac{m_1^2 + m_1 m_2 - m_1 m_2}{(m_1 + m_2)^2} = v_0^2 \frac{m_1^2}{(m_1 + m_2)^2}$$

$$U = \frac{m_1}{m_1 + m_2} v_0$$