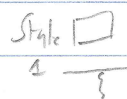
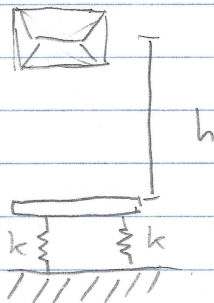


20-P-MOM-DY-12

A shipping package falls onto a platform supported by two springs. The package has a mass $m = 5 \text{ kg}$ and the platform $m = 2 \text{ kg}$. The springs have a spring constant $k = 10 \text{ N/m}$. The coefficient of restitution between the package and platform is $e = 0.5$. If the package falls from 1.5 m , determine the velocity of the platform after impact.

↳ and box



State 2:



Solution:

$$T_1 + V_1 = T_2 + V_2$$

$$\frac{1}{2} m_A v^2 = m_A g h$$

$$v_A = \sqrt{2gh}$$

A = package

B = platform

$$e = \frac{(v_B)_2 - (v_A)_2}{(v_A)_1 - (v_B)_1} = \frac{(v_B)_2 - (v_A)_2}{\sqrt{2gh}}$$

$$e\sqrt{2gh} = (v_B)_2 - (v_A)_2 \quad (v_B)_2 = e\sqrt{2gh} + (v_A)_2$$

$$m_A (v_A)_1 + m_B (v_B)_1 = m_A (v_A)_2 + m_B (v_B)_2$$

$$m_A \sqrt{2gh} = m_A (v_A)_2 + m_B (v_B)_2$$

$$m_A \sqrt{2gh} = m_A (v_A)_2 + m_B [e\sqrt{2gh} + (v_A)_2]$$

$$v_A = \frac{m_A \sqrt{2gh} - m_B e \sqrt{2gh}}{(m_A + m_B)}$$

$$v_B = e\sqrt{2gh} + (v_A)_2$$