

$$mgh = 0.5mv^2 \Rightarrow \cancel{0.5} \cancel{2} (9.81) (0.49) = 0.5v^2$$

$$v = \sqrt{2(9.81)(0.49)} = 3.1006 \text{ m/s}$$

$$\Delta V = v_f - v_i = 3.1006 \text{ m/s} - 0 = 3.1006 \text{ m/s}$$

$$m\Delta V = (5.3 \times 10^{-4} \text{ kg})(3.1006 \text{ m/s}) = 1.642 \times 10^{-3} \text{ N}$$

$$\vec{F} = \frac{m\Delta V}{\Delta t} \Rightarrow \frac{1.642 \times 10^{-3} \text{ N}}{(1/99 \text{ s})} = 0.1627 \text{ N}$$

$$m = \frac{F}{g} = 0.01652 \text{ kg} = 16.52 \text{ g}$$