

46. We use SI units so $m = 0.075$ kg. Equation 8-30 provides $\Delta E_{\text{th}} = -\Delta E_{\text{mec}}$ for the energy “lost” in the sense of this problem. Thus,

$$\begin{aligned}\Delta E_{\text{th}} &= \frac{1}{2}m(v_i^2 - v_f^2) + mg(y_i - y_f) \\ &= \frac{1}{2}(0.075)(12^2 - 10.5^2) + (0.075)(9.8)(1.1 - 2.1) \\ &= 0.53 \text{ J} .\end{aligned}$$