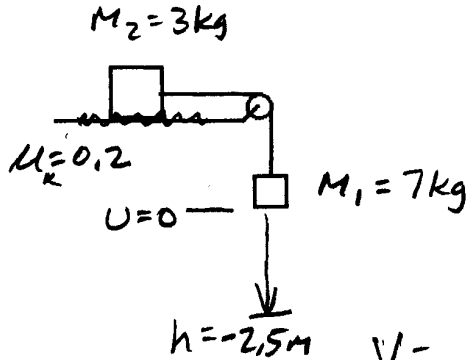


Conservation of Energy Quiz – Conservative Forces – quiz 28

$$K = \frac{1}{2}mv^2 \quad U_g = mgh \quad K_i + U_{gi} = K_f + U_{gf}$$

A M_2 3 kg block is pulled across a table by M_1 7 kg block hanging over the edge of the table. The blocks start from rest and there is friction on the table. The μ_k is 0.2. Find the speed of the 7 kg block after it has fallen 2.5 meters. You must use energy concepts. No tension, $\Sigma F = ma$, or kinematics are allowed.



$$K_i + U_i + E_m - E_{out} = K_f + U_f$$

$$0 + 0 + 0 - F_f d = \frac{1}{2}(M_1 + M_2)v^2 + M_1 g h_1$$

$$-\mu_k M_2 g d = \frac{1}{2}(M_1 + M_2)v^2 + M_1 g h_1$$

$$v = \sqrt{\frac{-\mu_k M_2 g d - M_1 g h_1}{0.5(M_1 + M_2)}}$$

$$= \sqrt{\frac{-0.2(3 \text{ kg})(9.8 \frac{\text{m}}{\text{s}^2})(2.5 \text{ m}) - 7 \text{ kg}(9.8 \frac{\text{m}}{\text{s}^2})(-2.5 \text{ m})}{0.5(7 \text{ kg} + 3 \text{ kg})}}$$

$$\boxed{v = 5.6 \frac{\text{m}}{\text{s}}}$$