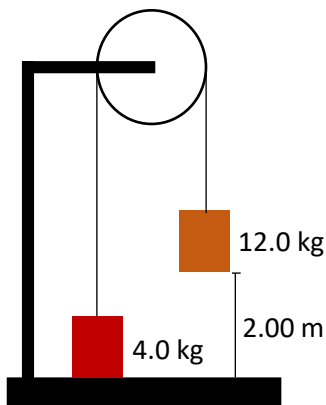


Name:	
ID:	
Total Score (out of 10 pts):	

-4/10 points for attending-

Question 1 (6/10 points)

A system of two masses is connected by a massless rope through a pulley that loses 20 J of energy for every meter of rope to friction. Find the speed the orange bucket (12.0 kg) when it hits the ground as released from 2.00 meters high. ($g \approx 10 \text{ m/s}^2$)



initial

$$U_i = 12.0 \text{ kg} \cdot 2.00 \text{ m} \cdot 10 \text{ m/s}^2 = 240 \text{ J}$$

final

$$U_f = 4.0 \text{ kg} \cdot 2.00 \text{ m} \cdot 10 \text{ m/s}^2 = 80 \text{ J}$$

$$K_f = \frac{1}{2} (4.0 \text{ kg} + 12.0 \text{ kg}) v^2 = 8.0 \text{ kg} v^2$$

$$W_{\text{other}} = -2.00 \text{ m} \times 20 \text{ J} = -40 \text{ J} \text{ since work is done by friction.}$$

$$W_{\text{other}} + U_i = U_f + K_f$$

$$-40 \text{ J} + 240 \text{ J} = 80 \text{ J} + 8.0 \text{ kg} v^2$$

$$v^2 = \frac{120}{8} \text{ m}^2/\text{s}^2$$

$$v = \sqrt{15} \text{ m/s}$$