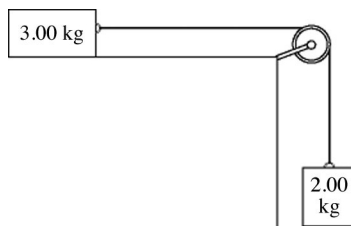


For full credit, be sure to show all your work.

1. A solid sphere (moment of inertia $I = \frac{2MR^2}{5}$) with mass 0.250 kg and radius 0.100 m starts from rest on top of a 8.00 m hill and rolls down to the bottom. Find the magnitude of the translational velocity when the sphere reaches the bottom of the hill. (1 point)

2. In the figure, two blocks, of masses 2.00 kg and 3.00 kg, are connected by a light string that passes over a frictionless pulley of moment of inertia $0.00400 \text{ kg} \cdot \text{m}^2$ and radius 5.00 cm. The coefficient of friction for the tabletop is 0.300. The blocks are released from rest. Using energy methods, find the speed of the upper block just as it has moved 0.600 m. (1 point)



3. A 5.00 kg mass is attached to a spring with spring constant 75.0 N/m. If the spring oscillates with simple harmonic motion, (a) find the period T and (b) find the mass that would be required to double the period to $2T$. (1 point)