• A block slides up a ramp (inclined at 30^o) with an initial velocity of $\vec{v} = 3.4\frac{m}{s}\hat{i}$ at the bottom of the ramp. If the ramp is frictionless, how far along the ramp does the block go? If there is a frictional force with coefficient of kinetic friction of 0.3, how far does the block go now?

• How much work does it take to lift a block of mass 2kg through a height of 0.5m? Where does the energy go? Now, if the block is released from rest 0.5m above the ground, what is the velocity of the block just before it strikes the ground?

•A ball is thrown upwards with an initial speed of 12 m/s. Using energy methods, how high does the ball go? Is this the same result as you would have obtained if you used your equations of motion for constant acceleration?

•A block of mass 1kg sits on a frictionless table. To the block is connected a cord that passes over a frictionless, massless pulley to which a ball of mass 0.5kg is attached. If the ball falls through a distance of 1m, how fast is the ball traveling?

• Suppose that the Nott Memorial is topped with an approximately hemispherical dome. Suppose that the dome is frictionless when wet. Somehow an individual has balanced a pumpkin at the top of the dome at an angle of $\theta_i = 0^o$, measured with respect to the vertical. Suppose that on a rainy night, a gust of wind starts the pumpkin sliding from rest. It loses contact with the dome when the line from the center of the hemispherical dome to the pumpkin makes a certain angle with respect to the vertical. At what angle does this happen?

• How much work is done by the gravitational force due to the Earth on the moon as the moon moves in circular orbit around the Earth? Is the moon speeding up or slowing down? If the gravitational force does no work on the moon, what then does it do?

- A 0.5kg mass is released from rest at a height of 1m above a spring with spring constant k = 8 N/m.

  a. What is the speed of the mass just before it strikes the spring?

  b. How far is the spring compressed? (Ignore any changes in gravitational potential energy of the mass as it comes to rest.)

  c. What are the frequency and period of the resulting motion?

• Given the force versus displacement graph shown below, what is the net work done in moving the block, with mass 1kg?