Phys 111 SI Session #12

**Topics:** Conservation of Energy, Work

1. A constant force of 300 N acts on a 120 kg refrigerator on a smooth surface.
   a. How far does the refrigerator travel if the work done on it is 1650 J?
   b. After reaching the distance in (a), the force is removed. How fast is the refrigerator moving at this point?

2. A purple water balloon is dropped from a building and hits the ground at 17.8 m/s. How tall is the building?

3. A 0.5 kg ball is thrown straight downward at 5 m/s from a height of 20 m. How fast is it travelling when it hits the ground?
   a. If 20% of the ball’s kinetic energy is lost during bouncing, how fast is the ball travelling immediately following the first bounce?
   b. How high does the ball bounce in the above case?

4. A 2 kg box is placed at the top of a smooth 5-meter ramp inclined at 30° from horizontal. At the bottom of the ramp, the ground is rough with μk = 0.20.
   a. How fast will the box be sliding at the end of the ramp?
   b. How far does the box slide after leaving the ramp?
   c. What is the work done by friction in this problem?

5. An ideal spring with \( k = 25 \text{ N/m} \) is compressed horizontally 10 cm by a 4 kg mass
   a. How much potential energy is in the spring?
   b. Once the spring is released, what is the speed of the mass?
   c. If the mass is released onto a rough table and travels 2 meters before coming to rest, what is the \( \mu_k \) between the mass and the table?