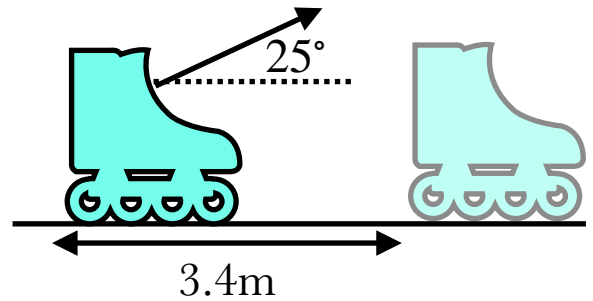


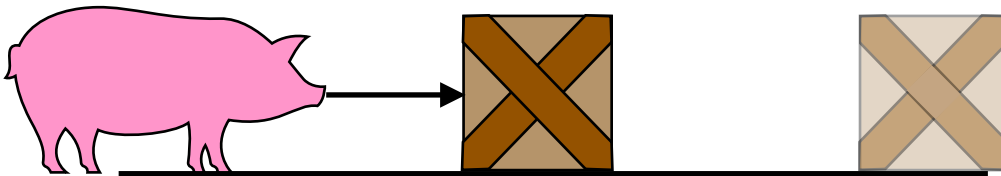
Week 5: Energy

Additional Homework

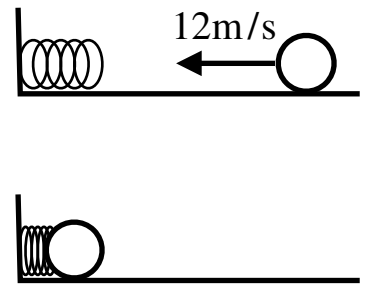
1. A rollerskate is dragged across the ground for 3.4 meters, by someone pulling on its shoelace. The shoelace makes a 25° angle with the horizontal, and the tension in the shoelace is 5.2N. What is the work done on the rollerskate by the shoelace? Be sure to include whether it is positive or negative.



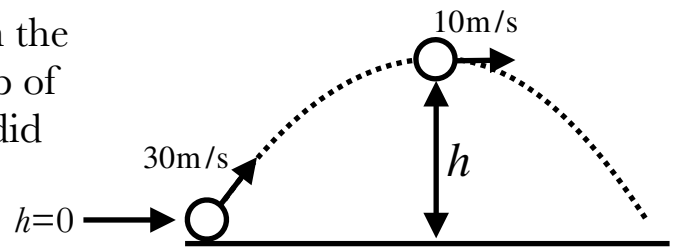
2. A helpful pig pushes a crate across the barn floor. Initially, the crate has a kinetic energy of $E_i = 20\text{J}$. The pig applies a steady force of 8N on the box, and the kinetic frictional force of the floor on the box is 5N. Once the box has moved 3m to the right, what is the kinetic energy of the box?



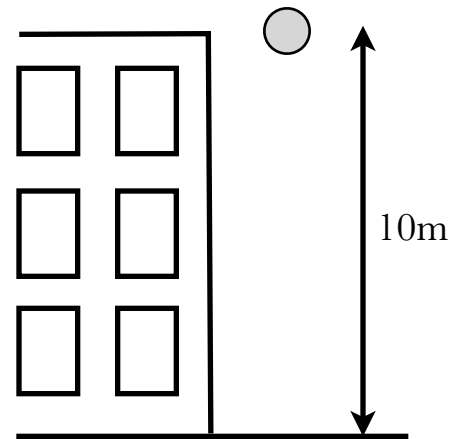
1. A 5kg ball is rolling with a speed of 12m/s towards a spring with a spring constant of $k = 3000\text{N/m}$. The ball hits the spring and compresses it, causing the ball to stop for a moment. How much does the spring compress?



2. A 4kg ball is launched into the air from the ground with a speed of 30m/s. At the top of its arc, it is moving at 10m/s. How high did the ball go? Let ground level be $h=0$.



3. A 2kg ball is dropped from the top of a 10 meter building. How fast will the ball be moving *right before* it hits the ground?



4. A 0.8kg ball is launched into the air by a spring with $k = 8000\text{N/m}$ that has been compressed by 0.07m. As it rises into the air, **air resistance does -5J of work** on the ball. How high does the ball go?

