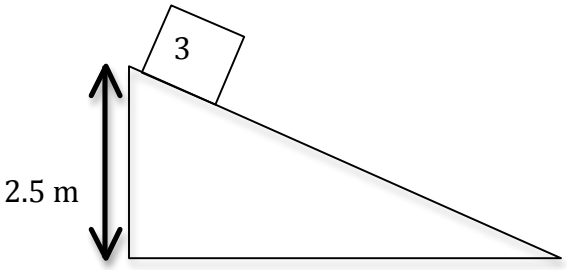
Conservation of Energy

1. An egg falls from a nest 4 m above the ground.
   a. What is the egg's speed when it is 3 m above the ground?
   b. What is the egg's speed when it hits the ground?

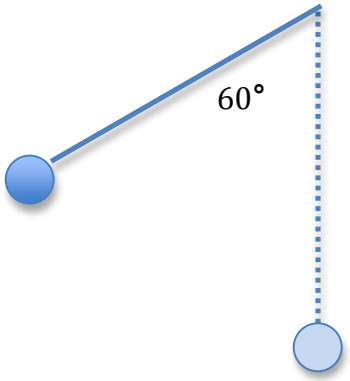
2. A ball is thrown so that its maximum height is 10 m. What was its speed when it was 6 m above the point of release?

3. A box is released at the top of the fictionless incline 2.5 m tall.



   a. Find the speed at the bottom.
   b. Find the speed at the bottom if 20% of the energy is lost to friction.

4. A 1 kg ball is attached to a 2.5 m long rope. It is released from rest at the angle shown. Find the speed at the bottom.



5. The box in #3a is now moving at 3 m/s at the top. Find the speed at the bottom.

6. The roller coaster and rider have a mass of 100 kg. If it starts from rest, find the speed at A, B, C, and D. Assume no friction.

7. When the roller coaster reaches D on level ground, it must come to a stop in 20 m.
   a. What acceleration is necessary?
   b. What stopping force is necessary?