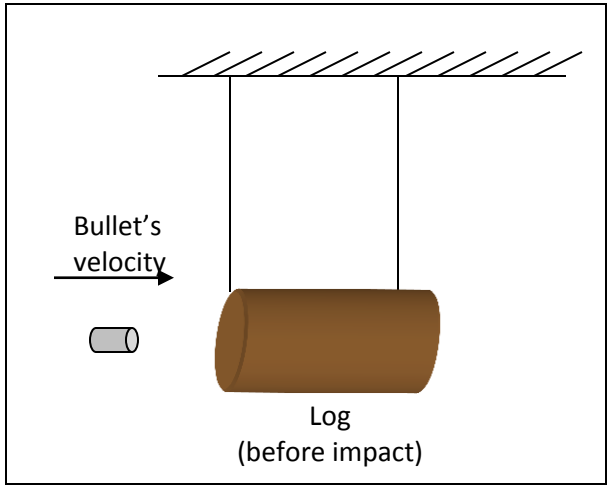
1. A man is walking through the forest when he is suddenly chased by a bear. The man escapes by jumping onto a frozen pond. He slides across the frictionless surface of the pond at 3 m/s. In order to stop himself, he lifts his rifle and starts shooting bullets. The man (including his rifle) has a mass of 97 kg. Each .22 caliber bullet has a mass of 31 grams and a muzzle speed of 440 m/s. How many bullets does he need to shoot in order to come to a stop?

2. Consider again the man in the previous problem. If he shoots the same number of bullets as found in the previous problem in a direction perpendicular to his initial velocity (due to confusion based on the proximity of the bear), what is his final velocity?

3. A 200 kg bear is sliding across a frozen pond carrying the body of a 97 kg man. The bear is traveling with a velocity of 3 m/s. He flings the corpse with a velocity of 7 m/s (relative to the ground) at an angle of 57° relative to his initial velocity. What is the bear's final velocity?

4. A log with a mass of 10 kg is hung from a branch in a tree by strings that are 2 meters long, as shown. A bullet with a mass of 20 grams initially traveling with a speed of 500 m/s is shot into the log. What is the momentum of the log immediately after the bullet comes to a complete stop relative to the log (the bullet is embedded in the log)?



5. For the system in the previous problem, what is the kinetic energy of the bullet before impact? What is the kinetic energy of the system after the impact?

6. The log swings up on its strings, as shown. What height does it reach?