1. Categorize each of the following as a conservative or non-conservative force:
   1. Gravitational force
   2. Frictional force
   3. Applied force
   4. Electrostatic force
   5. Tension force
2. A bike rider approaches a hill at a speed of 10.5 m/s. The combined mass of the bike and the rider is 85.0 kg. The rider coasts up the hill. Assuming there is no friction, at what height will the bike come to a rest?
3. A child on a swing has a maximum height of 1.75 m. What is the child’s speed when he is at a height of only 0.5 m?
4. Your friend Charlie, who has a mass of 65 kg, reaches a maximum height of 1.5 meters while swinging. You push him in the direction he is moving with a force of 325 N over a distance of 0.75 m. What is Charlie’s new maximum height?
5. A sled and rider, with a total mass of 85 kg, are perched on top of a 25.0 m tall frictionless hill. A second hill is 12.0 m tall (see diagram). The rider is given an **initial push**, providing 7674 J of kinetic energy.
   1. What is the total mechanical energy (after the push) of the sled/rider at the top of the tall hill?
   2. What is the velocity when the sled reaches the top of the 12 m tall hill?