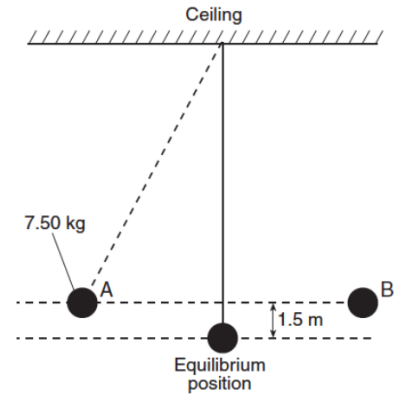


Conservation of Energy

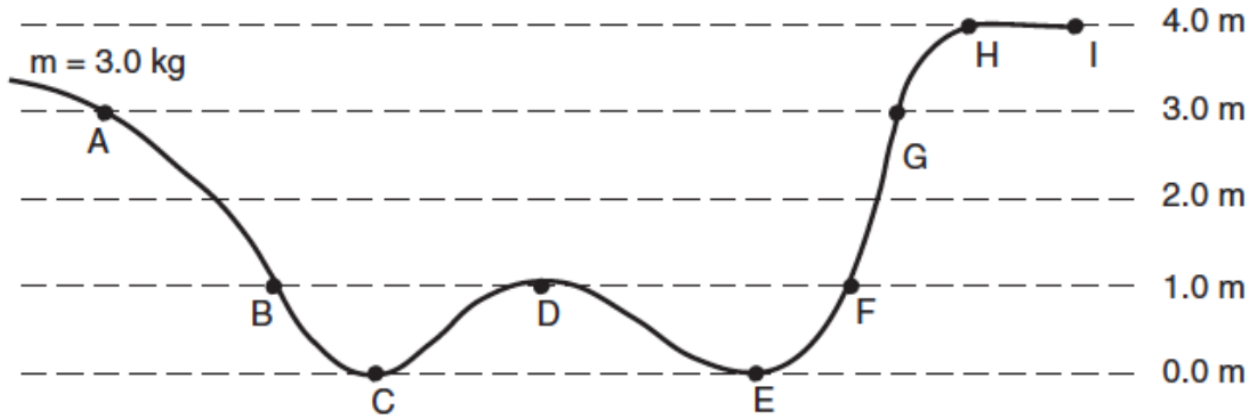
- 1) A book of mass m falls freely from rest to the floor from the top of a desk of height h . What is the speed of the book upon striking the floor?
- 2) A water fountain shoots water straight up 5.20 m into the air. What is the speed of the water when it leaves the fountain?

- 3) A pendulum is made from a 7.50-kilogram mass attached to a rope connected to the ceiling of a gymnasium. The mass is pushed to the side until it is at position A, 1.5 m higher than its equilibrium position. After it is released from rest at position A, the pendulum moves freely back and forth between positions A and B, as shown in the diagram below. What is the speed of the mass as it swings freely through its equilibrium position?

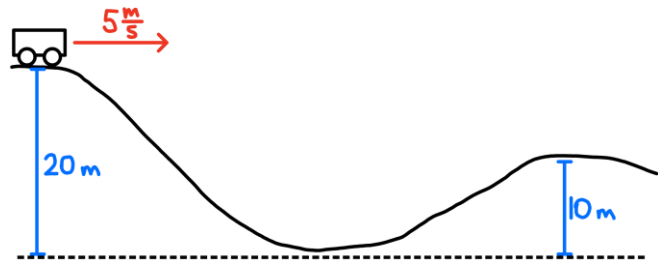


- 4) A 1.0 kg rock is dropped from a cliff 90. m high. After falling 20. m, what is the kinetic energy of the rock?
- 5) A child, starting from rest at the top of a playground slide, reaches a speed of 7.0 m/s at the bottom of the slide. What is the vertical height of the slide?
- 6) A 0.50 kg ball is thrown vertically upward with an initial kinetic energy of 25 J. How high will the ball rise?
- 7) A 65 kg pole vaulter wishes to vault to a height of 5.5 m. Calculate the speed the vaulter must attain to have the necessary kinetic energy.
- 8) A 1.00 kg ball is dropped from the top of a building. Just before striking the ground, the ball's speed is 12.0 m/s. What was the ball's gravitational potential energy, relative to the ground, at the instant it was dropped?
- 9) A skier is coasting up a 4.0 m high hill. If she is moving at a speed of 6.0 m/s when she is 2.0 m up the hill, will she make it to the top of the hill?
- 10) A 55 kg diver falls freely from a diving platform that is 3.00 m above the surface of the water in a pool. When she is 1.00 m above the water, what are her gravitational potential energy and kinetic energy with respect to the water's surface?
- 11) A mass m is thrown horizontally at 5.00 m/s off of a 20.0 m high cliff. Find its speed at impact.
 - a) Solve using kinematics
 - b) Solve using energy

- 12) A 3.0 kg object is placed on a frictionless track at point A and released from rest. (Assume the gravitational potential energy of the system to be zero at point C.)



- Calculate the gravitational potential energy of the object at point A.
 - Calculate the speed of the object at point B.
 - Calculate the speed of the object at point C.
 - Which letter represents the farthest point on the track that the object will reach?
- 13) A cart has a speed of 5 m/s at the top of a 20 m high hill. What is its speed at the top of a 10 m high hill? Assume no friction forces.



- 14) Tarzan has a mass of 85.0 kg and he runs at 6.00 m/s. He grabs onto a vine and swings up until he stops. How high can he swing?
- 15) A 500. kg roller coaster is moving at 1.20 m/s at the top of a 30.0 m high hill. Assuming no friction, what will be the speed of the coaster when it zooms down the hill at is at height of
- 25.0 m
 - 12.0 m
 - 0.00 m

- 16) A block starts from rest and slides down a frictionless ramp. Determine the speed at the bottom of the ramp using...
- dynamics and kinematics
 - energy

