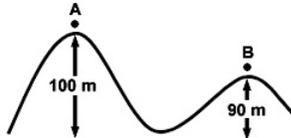


Conservation of Energy Problem Set: Solutions

Physics 11

Complete the following problems on a separate piece of paper. At least one of these problems will be the quiz problem for tomorrow.

- (1) A skier glides down a frictionless hill of 100 meters, then ascends another hill, of height 90 meters, as shown in the figure below. Assume the bottom of the hill is height 0.



- (a) What is the speed of the skier when she reaches the top of the second hill?

10 m/s

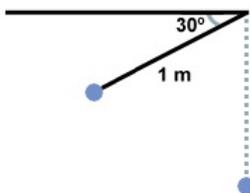
- (b) Another hill goes straight from 100 m to 90 m. What would the speed of the skier be when she got to the 80 m point?

10 m/s

- (c) What was the change in potential energy, given that the mass of the skier is 50 kg?

-5000 J

- (2) A pendulum with string of length 1 m is raised to an angle of 30° below the horizontal, as shown below, and then released. What is the velocity of the pendulum when it reaches the bottom of its swing?



3 m/s

(3) A frustrated student throws her 1.0 kg computer out of her second story apartment (10 m off the ground) at 5 m/s.

(a) What was the kinetic energy when the computer hit the ground?

(b) What was the change in kinetic energy?

(4) A 3 kg bowling ball is dropped from the top of a building.

(a) If it hits the ground with a speed of 42 m/s, how tall was the building?

(b) Would the height change if we dropped a tennis ball rather than a bowling ball? Explain

(c) Would the height change if we dropped the ball on Mars rather than on the Earth? Explain.

(5) MacGyver is on a planet where the acceleration due to gravity is $g=5.2 \text{ m/s}^2$. He runs 5m/s out of a burning building from a height of 15 m. What is his speed when he hits the ground?

(6) A box slides 10 m down a frictionless ramp which is inclined at a 5° to the ground. If the box starts from rest, what is the speed of the box after the 10 m slide? Does it make a difference if the box is now at ground level?