

CONSERVATION OF ENERGY SAMPLE PROBLEMS

1. An 8 kg flower pot falls from a window ledge 12 m above a sidewalk.
 - a. What is its kinetic energy right before it hits the ground?
 - b. Using energy considerations, determine the velocity right before it hits the ground.

2. A 2 kg ball is fired up into the air. If it is given 200 J of kinetic energy when it is fired,
 - a. How high will it go?
 - b. What is its velocity half way up?

3. A kid is given a 6 m/s push down a frictionless hill from a start height of 10 m.
 - a. How fast is she going when she gets to the bottom of the hill?
 - b. If she then continues on up another frictionless hill, how high up will she get?

4. A bow with a spring constant of 300 N/m is stretched back 30 cm. How fast will an arrow be shot from it if it has a mass of 300 grams?

5. A 1 kg brick is dropped from 3 meters onto a spring with a spring constant of 400 N/m.
 - a. If we neglect the change in height of the spring, how much will it compress?
 - b. Is it OK if we neglect the change in height of the spring, why or why not?

6. Mr. Maloney's pendulum is swinging back and forth. He has a 1 kg mass on the end, the string length is 2 meters, and he started it by pulling it back 35° , determine
 - a. The initial potential energy
 - b. Speed at the bottom,
 - c. Speed half way to the bottom
 - d. How high would it go if a student gave it a 3 m/s push.

7. A child slides down a frictionless hill. If she starts from rest and ends up going 12 m/s at the bottom, how high is the hill?

8. A 100 gram marble is shot from a spring loaded gun and rises 20 meters straight up. If the compression piston of the gun compresses 15 cm, determine
 - a. The speed of the marble when it leaves the gun
 - b. The spring constant of the firing spring

9. EXTENSION (tough): A 0.50 kg block is attached to a 500 N/m spring which is compressed 0.50 meters. It is in a vertical position and then released. How high will it rise to if it stays attached to the spring? (may have to use quadratic equation)