Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period: \_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_

**Conservation of Energy**

The **total energy** in a system of objects is the sum of their potential and kinetic energies: $TE=K+U$

**Conservation of Energy**

It states that the **total amount of energy** in an isolated system **remains constant** over time.

$$TE\_{i}=TE\_{f}$$

 **Kinetic Energy Potential Energy**

 $K=\frac{1}{2}mv^{2}$ $U=mgh$

1) A 0.85 kg soccer ball is booted straight up in the air. If it left the soccer player’s foot at a height of 1.0 m and reaches a height of 47.0 m, what was its kinetic energy immediately after it was kicked?

2) What was the speed of the ball in question #1 when it had reached a height of 24.0 m?

3) A 0.575 kg smurf is thrown straight down from a 10.0 m high toadstool. If his final speed is 18.0 m/s, how fast was he traveling initially?

4) Another 0.575 kg smurf (there are 99 of them…) is now thrown horizontally from a 50.0 m cliff at 8.00 m/s. How much kinetic energy does it have when it is 15.0 m from the ground?

5) A box slides down a frictionless ramp as shown. How fast is it traveling at the bottom?



6) A pendulum if pulled aside as shown. The pendulum bob has a mass of 0.500 kg. If the pendulum is released from this point how fast will it be moving when it returns to the equilibrium point?



7) A box is projected up a long ramp (incline plane with the horizontal Ѳ=37⁰) with an initial speed of 10 m/s. If the surface of the ramp is very smooth (essentially frictionless),

a. how high up the ramp will the box go?

b. What distance along the ramp will it slide?

d

h

Ѳ

8) A skydiver jumps from a hovering helicopter that’s 3000 meters above the ground. If air resistance can be ignored, how fast will he be falling when his altitude is 2000?

9) Wile E. Coyote (mass=40kg) falls off a 50-meter-high cliff. On the way down, the force of air resistance has an average strength of 100N. Find the speed with which he crashes into the ground.





