11.2(B) Conservation of Mechanical Energy

**Mechanical Energy**

Mechanical Energy is the sum of the potential and kinetic energies of an object.

\[ E = K + U \]

**Conservation of Mechanical Energy**

In systems with conservative forces only, the mechanical energy \( E \) is conserved.

\[ E_i = E_f \]

**Conservation of Mechanical Energy**

During a hurricane, a large tree limb, with a mass of 22.0 kg and a height of 13.3 m above the ground, falls on a roof that is 6.0 m above the ground. What is the speed of the limb when it reaches the roof?
11.2(B) Conservation of Mechanical Energy

Conservation of Mechanical Energy
Three important questions:
1. Is the object moving?
2. Is the object at \( y = 0 \)?
3. Is there a spring being stretched or compressed?

\[ E_i = E_f \]

Conservation of Energy

4. A 68.2 kg diver steps off a 5.0 m platform. Ignoring air resistance, what is the kinetic energy and velocity of the diver as he enters the water?

5. In the bottom of the ninth inning, a player hits a 0.15-kg baseball over the outfield fence. The ball leaves the bat with a speed of 36 m/s, and a fan in the bleachers catches it 7.2 m above the point where it was hit. Assuming frictional forces can be ignored, find its speed when caught.

Conservation of Energy

During a hurricane, a large tree limb, with a mass of 22.0 kg and a height of 13.3 m above the ground, falls on a roof that is 6.0 m above the ground. What is the speed of the limb when it reaches the roof?

\[ K_i + U_g,i + U_s,i = K_f + U_g,f + U_s,f \]

\[ \sqrt{2gh_i} = V_f = 12 \text{ m/s} \]

Conservation of Energy

A 68.2 kg diver steps off a 5.0 m platform. Ignoring air resistance, what is the kinetic energy and velocity of the diver as he enters the water?

\[ V = \sqrt{2gh_i} = 330 \text{ J} = \frac{1}{2} m v^2 \]

\[ V = 9.9 \text{ m/s} \]

Conservation of Energy

In the bottom of the ninth inning, a player hits a 0.15-kg baseball over the outfield fence. The ball leaves the bat with a speed of 36 m/s, and a fan in the bleachers catches it 7.2 m above the point where it was hit. Assuming frictional forces can be ignored, find its speed when caught.

Which Slide is Better?