10.2 Conservation of Mechanical Energy

**Conservation of Mechanical Energy**

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<th>Learning Target</th>
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<td>10.2</td>
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**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.

\[ E_i = E_f \]

\[ K_i + U_i = K_f + U_f \]

**Fill In the Blanks**

\[ m = 1.0 \text{ kg} \]

**Fill In the Blanks**

\[ m = 1.0 \text{ kg} \]
10.2 Conservation of Mechanical Energy

Graduation Fling

At the end of a graduation ceremony, graduates fling their caps into the air. Suppose a 0.120-kg cap is thrown straight upward with an initial speed of 7.85 m/s, and that air resistance can be ignored. Find the speed of the cap when it is 1.18 m above the release point.

\[
E_i = E_f
\]

\[
K_i + U_i = K_f + U_f
\]

\[
\frac{1}{2}mv_i^2 = \frac{1}{2}mv_f^2 + mgh
\]

\[
\left(\frac{1}{2}V_i^2\right) - \left(\frac{1}{2}V_f^2\right) = \frac{1}{2}V_f^2
\]

\[
V_f = 6.20 \text{ m/s}
\]

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?

\[
E_i = E_f
\]

\[
K_i + U_i = K_f + U_f
\]

\[
mgh = \frac{1}{2}mv^2
\]

\[
\sqrt{2gh} = V_f
\]

\[
V_f = 9.99 \text{ m/s}
\]

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.

\[
E_i = E_f
\]

\[
K_i + U_i = K_f + U_f
\]

\[
\frac{1}{2}mv_i^2 = \frac{1}{2}mv_f^2 + mgh
\]

\[
V_f = 34 \text{ m/s}
\]

PROBLEMS

Which Slide is Better?

LETS'S PRACTICE

PROBLEMS (6-10)