10.1 Potential Energy and the Work Done by Conservative Forces

Potential Energy and Conservation of Energy

Conservative vs. Nonconservative Forces

<table>
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<th>CONSERVATIVE FORCES</th>
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Potential Energy and the Work Done by Conservative Forces

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<th>Description</th>
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<td>I can define, analyze, and solve problems involving potential energy and the work done by conservative forces.</td>
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EXAMPLES
Gravity & Springs  
EXAMPLES  
Friction, Tension, Muscles

Work Done on a Closed Path

\[ W = 0 \]

Conservative Force Definitions

• A conservative force is a force that does zero total work on any closed path.

Different Paths, Different Forces

\[ W = -mgd \]

Conservative Force Definitions

• A conservative force is a force that does zero total work on any closed path.

• If the work done by a force in going from an arbitrary point A to an arbitrary point B is independent of the path from point A to B, the force is conservative.

Energy

The ability to do work.
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January 28, 2019

Energy and Ice Cream

Kinetic Energy

\[ KE = \frac{1}{2} m v^2 \]

Would you stand here?

Potential Energy

Potential Energy (U)
is a storage system for energy.

Final Ascent

Work Done by a Conservative Force

When a conservative force does an amount of work \( W_c \), the corresponding potential energy \( U \) is changed.

\[ W_c = -\Delta U \]
1. An 82.0 kg mountain climber is in the final stage of the ascent of 4301-m-high Pikes Peak. What is the change in gravitational potential energy as the climber gains the last 100.0 m of altitude?

2. A candy bar called the Mountain Bar has a calorie content of 212 Cal = 212 kcal, which is equivalent to an energy of $8.87 \times 10^5$ J. If an 81.0-kg mountain climber eats a Mountain Bar and magically converts it all to potential energy, what gain of altitude would be possible?