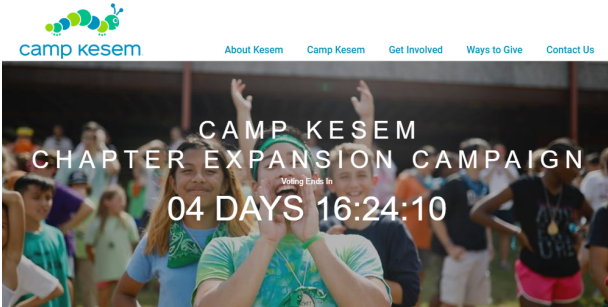


<https://vote.campkesem.org/>



| PRACTICE | LABS | TESTS |
|--------------------------|------------------------------|------------------------------|
| Unit 9 Practice Problems | Stair Power Lab due tomorrow | Unit 10 Test Thursday 2/7/19 |

UNIT 10

Potential Energy and Conservation of Energy

Potential Energy and the Work Done by Conservative Forces

| Learning Target | Description |
|-----------------|--|
| 10.1 | I can define, analyze, and solve problems involving potential energy and the work done by conservative forces. |



Conservative vs. Nonconservative Forces

| CONSERVATIVE FORCES | NONCONSERVATIVE FORCES |
|--|--|
| <ul style="list-style-type: none"> Work is stored in the form of energy that can be released at later time. | <ul style="list-style-type: none"> Work cannot be recovered later as kinetic energy. Instead, it is converted to other forms of energy. |

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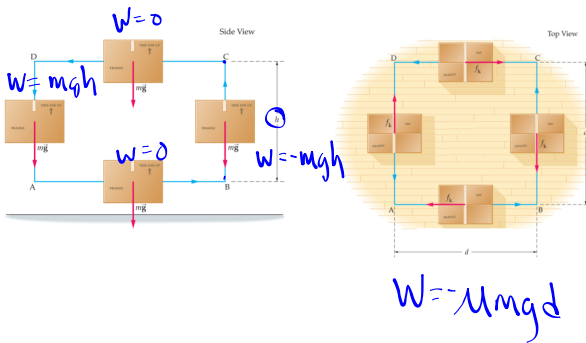
Conservative vs. Nonconservative Forces

| CONSERVATIVE FORCES | NONCONSERVATIVE FORCES |
|--|---|
| <ul style="list-style-type: none"> Work is stored in the form of energy that can be released at later time.  <p>EXAMPLES Gravity & Springs</p> | <ul style="list-style-type: none"> Work cannot be recovered later as kinetic energy. Instead, it is converted to other forms of energy.  <p>EXAMPLES Friction, Tension, Muscles</p> |

Conservative Force Definitions

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

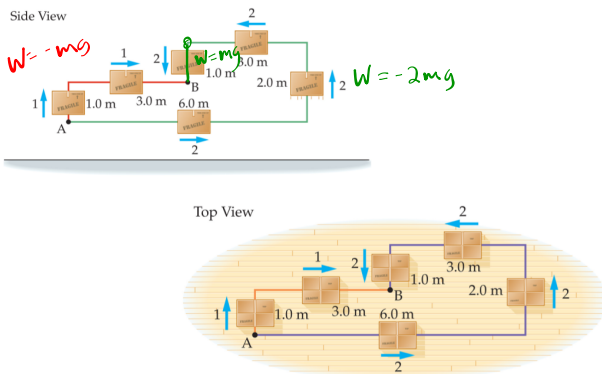

Work Done on a Closed Path



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.

Different Paths, Different Forces

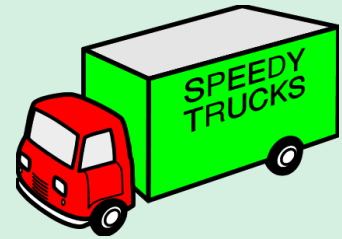
Energy
The ability to do work.



Energy and Ice Cream

Kinetic Energy

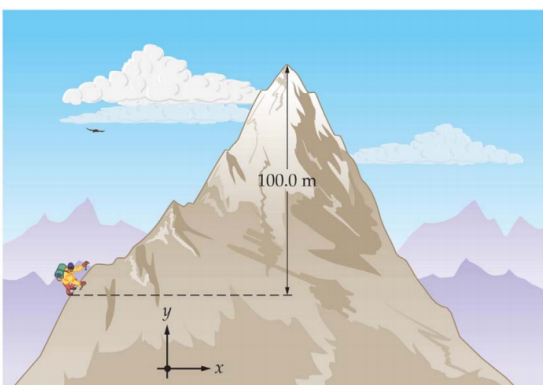
$$KE = \frac{1}{2} m v^2$$



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.

$$W_c = -\Delta U$$

Gravitational Potential Energy

Gravitational Potential Energy depends on weight and height, h , but it is independent of horizontal position.

POTENTIAL IN-CLASS PROBLEMS

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 8.87×10^5 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?

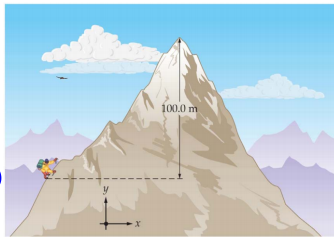
Pike's Peak or Bust

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?

$$\Delta U = U_f - U_i$$

$$= mgh_f - mgh_i$$

$$8.03 \times 10^4 \text{ J}$$



$$W_c = -mgh$$

Converting Food Energy to Mechanical Energy

2. A candy bar called the Mountain Bar has a calorie content of 212 Cal = 212 kcal, which is equivalent to an energy of 8.87×10^5 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?

$$\Delta U = mgh$$

$$\frac{\Delta U}{mg} = h = 1110 \text{ m}$$

PRACTICE

PROBLEMS
(1-5)

