Chapter 4: Work and Energy
Section 2: Describing Energy

Energy: the ability to cause change
- The ability to do work
- Measured in Joules, like work (J)

System: anything around which you can imagine a boundary
- When one system does work on a second system, energy is transferred from the first system to the second system

Different forms of Energy:
- Mechanical energy – energy of motion
- Electrical energy – transferred from a power plant to your home
- Chemical energy – chemical bonds in gasoline fuel your car
- Radiant energy – energy from the Sun to the Earth

Energy from the Sun that warms you and the energy you get from food are different forms of the same thing (energy).
- Think of it in terms of money…if everyone owed me $1.00 but each one of you paid me in a different way, I still get my $1.00
  - Someone could give me 100 pennies.
  - Someone could give me 4 quarters
  - Someone could give me a dollar bill

Kinetic energy (KE): the energy due to motion
- Depends on the objects mass and speed
- $KE = 1/2mv^2$
  - m = mass in kg
  - v = velocity (speed) in m/s
  - KE = energy in Joules = kg*m/s

Potential energy: the energy that is stored due to the interactions between objects
- Example would be an apple on a tree

**Elastic potential energy:** the energy that is stored by compressing or stretching an object
- When you stretch a rubber band and let it go, it has kinetic energy because it is moving. Where did this energy come from?
    o It came from the elastic potential energy of the stretch rubber band. It was transferred from potential energy to kinetic energy

Chemical potential energy: the energy that is due to chemical bonds
- Examples include the food you eat and the gasoline in cars
- When you burn something, chemical potential energy is transferred to thermal (heat) or radiant energy

Gravitational potential energy (GPE): the energy that is due to the gravitational forces between objects
- An example is the apple in the tree
- GPE = mgh
    o m = mass in kg
    o g = acceleration due to gravity in m/s^2
    o h = height in meters (m)
- To calculate the GPE, the height is measured from a reference level

Object C

Object B

Object A

Ground
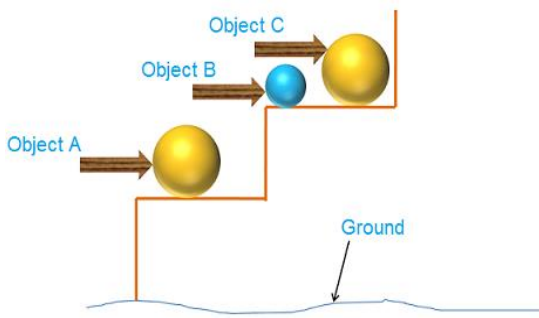
Let's say object A and C have a mass of 10. kg and object B has a mass of 5.0 kg. The 1st height will be 1.0 m and the 2nd height will be 2.0 m. Let's calculate the GPE. Which one has the greatest GPE? What if I put another object similar to A and C on the ground? What would its GPE be?