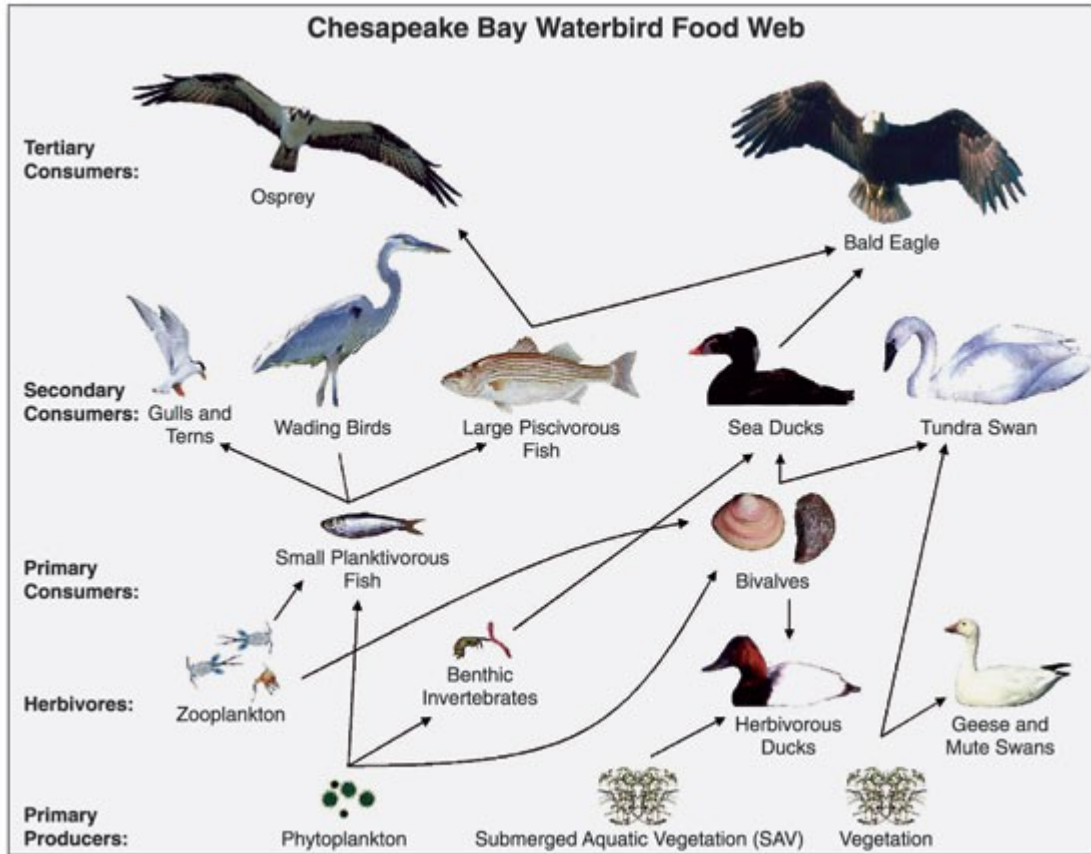


Energy, Work and Power

Chesapeake Bay Waterbird Food Web



Energy

The ability to do work...

OR

The ability to cause pain!

Types of Energy

**Kinetic
Energy**

Chemical Energy

**Thermal/Heat
Energy**

**Radiation (including
light) Energy**

**Elastic Potential
Energy**

Sound Energy

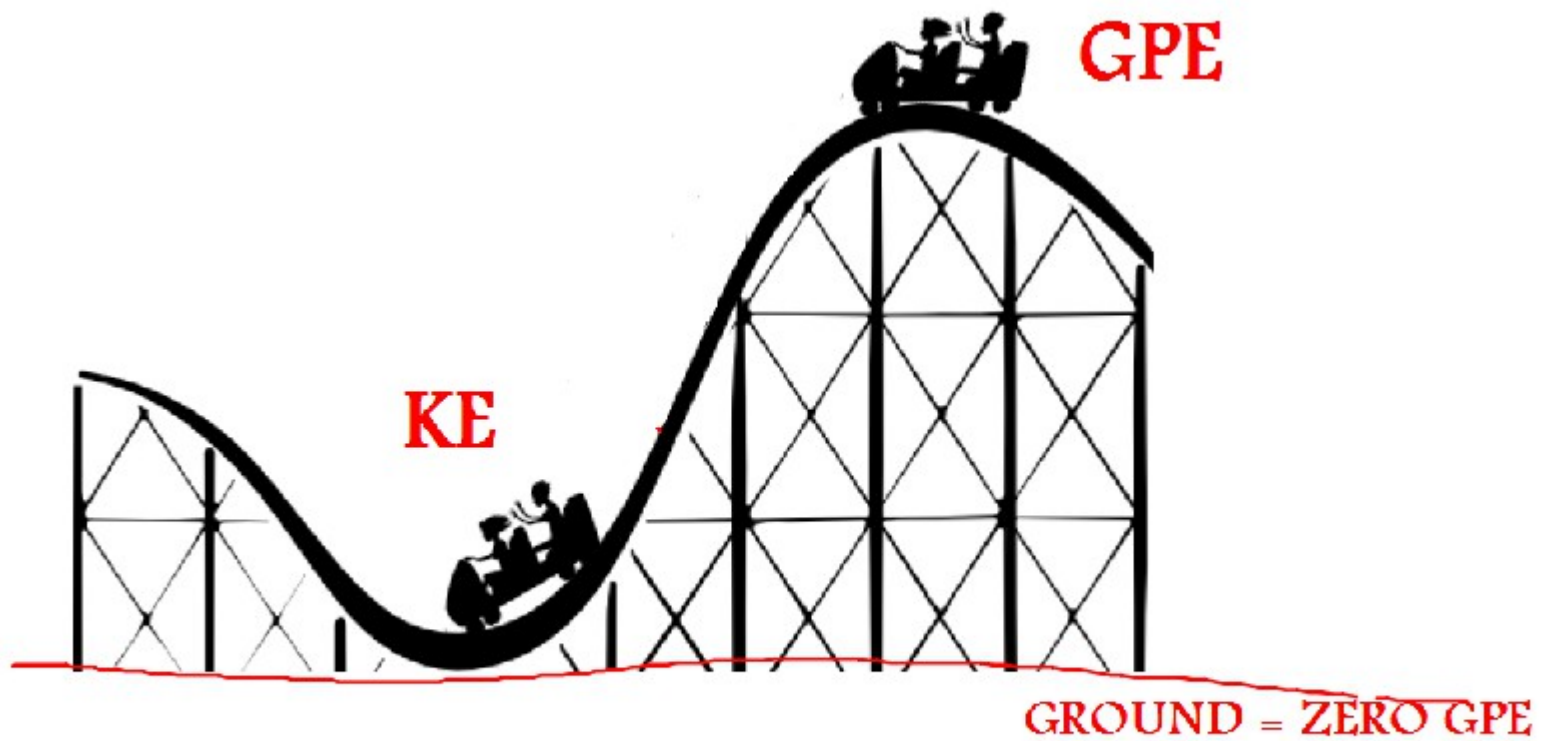
Electrical Energy

**Gravitational
Potential Energy**

Magnetic Energy

Conservation of Energy

**Energy is neither created nor destroyed.
It only changes from one type to another.**



Two Types of Energy

Gravitational Potential Energy

$$\text{GPE} = mgh$$

m - mass (kg)

g - accel. due to gravity
(9.8 m/s/s)

h - height (m)

Kinetic Energy

$$\text{KE} = \frac{1}{2} mv^2$$

v - velocity (m/s)

$$\text{GPE}_{\text{top}} = \text{KE}_{\text{bottom}}$$

$$(\text{mgh})_{\text{top}} = \left(\frac{1}{2}mv^2\right)_{\text{bottom}}$$

What is work?

If you apply a force to an object, and the object moves in the direction of the force, then you are doing work on the object.

$$\boxed{W = F \cdot d}$$

F - force (N)

d - distance (m)

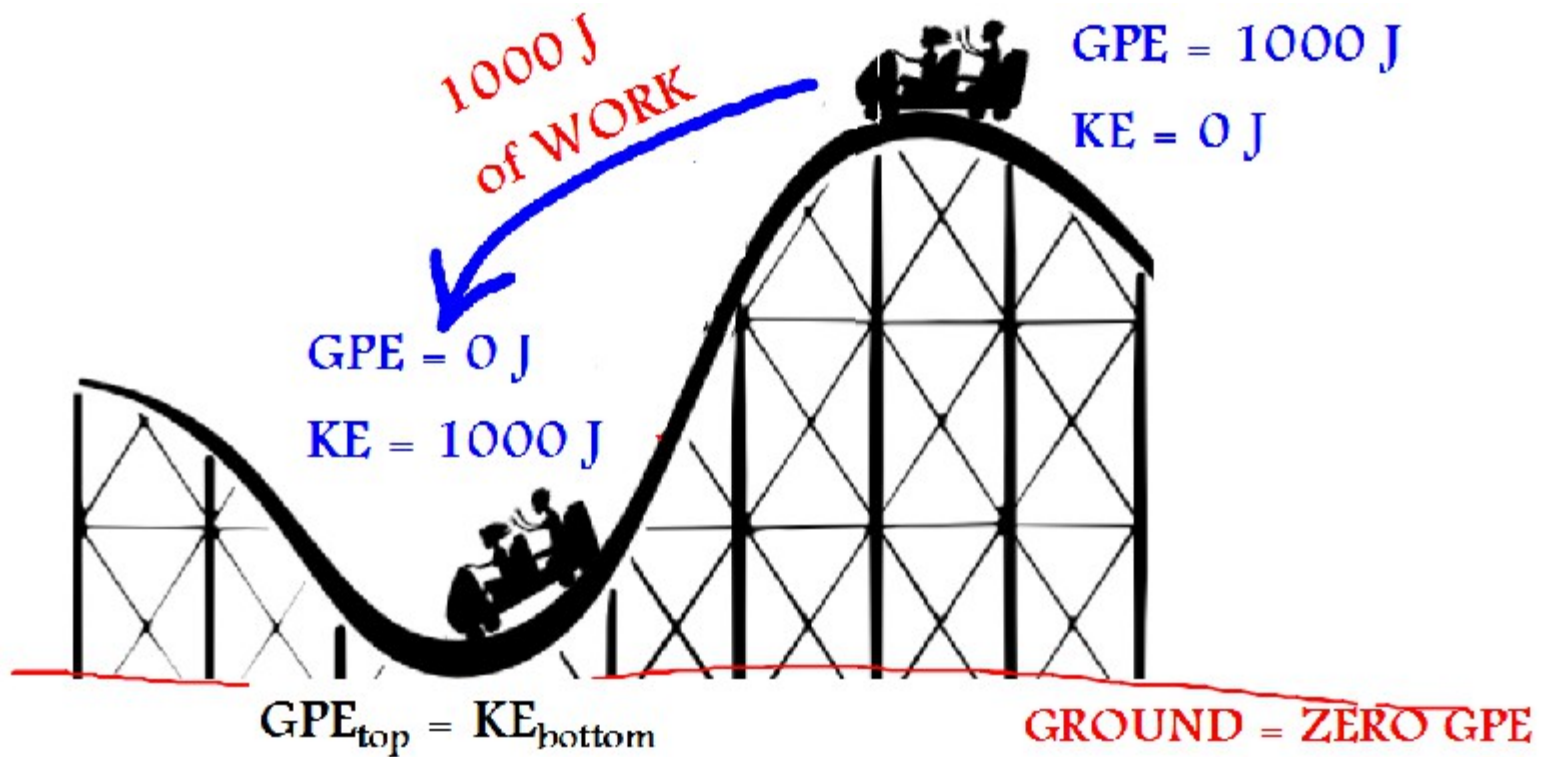
What is work?

$$W = F \cdot d = F(0) = 0 \text{ J}$$

What is work?

Work is an energy transfer from one type to another.

**So W is measured in:
Joules, J**



$$(mgh)_{\text{top}} = \left(\frac{1}{2}mv^2\right)_{\text{bottom}}$$

Power

Power is the rate of doing work.

$$P = \frac{W}{t}$$

W - work (J)

t - time (s)

Power

Unit of Power:

Watts, W

(or J/s)