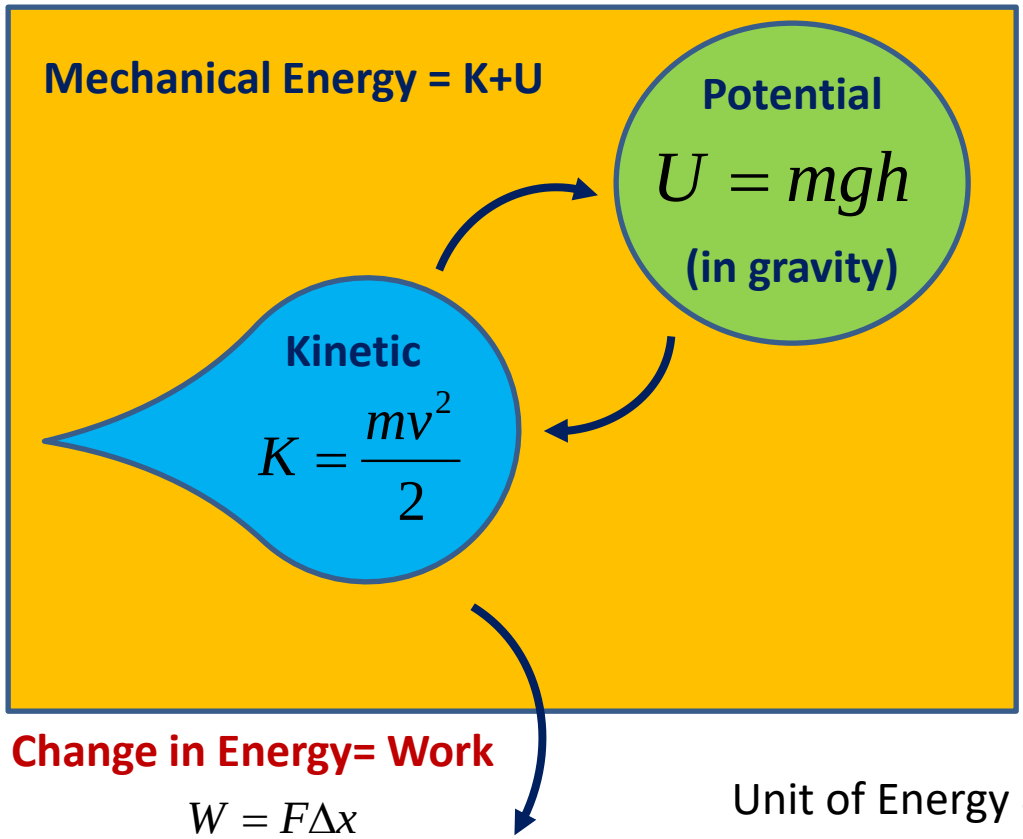
Mechanical Energy and Work



Unit of Energy & Work is called Joule (J)

$$1J = 1N \cdot m = 1\frac{kg \cdot m^2}{s^2}$$

Homework

Problem 1

Find Energy in Joules, for the following cases:

a) Kinetic energy of yourself running as fast as you can.

b) Potential energy of yourself after climbing the mount Everest.

c) Minimal work you need to do to shut an arrow of mass 50 g to the height 100m, with a bow.

d) Kinetic energy of all molecules in 1 cubic meter of air. Assume them to have a typical speed about 500m/s. Density of air is 1.2 kg/m^3.

Problem 2. Kingda Ka, the highest roller coaster in the world, has a drop of 140m. Imagine the roller coaster follows the trajectory pictured below, and neglect any friction or air resistance (energy is constant).

a) What is the speed of the roller coaster on points A and B?

- Hint 1: The loss of potential energy will be gained as kinetic energy.
- Hint 2: You do not need to know the mass of the roller coaster to solve this problem.

b) Bonus: The roller coaster will try to climb back up to point C. What is the highest point that the roller coaster could get to?