First Law of Thermodynamics

$$\Delta U = Q + W$$

U – Internal (Thermal) Energy

Q – Heat adsorbed by the System

W=Fd – Work done by external forces (Force * Displacement)

Conservation of Energy Revisited:

$$E_{kin} + E_{pot} + U = const$$

"In thermally isolated system (Q=0), Total Energy (Mechanical+Internal) is conserved"

Homework

Problem 1

A cyclist is moving at speed v=5m/s. He applies breaks and comes to a complete stop. Assuming that all the heat generated during the breaking is concentrated in rubber blocks that "squeeze" the wheel, find the change in temperature of the rubber after the breaking, ΔT. Mass of the cyclist with the bicycle is M=100kg, total mass of all rubber blocks is m=50g. Specific heat capacity of rubber is C=2 kJ/kg/K.

Problem 2

A droplet of water falls from the height h=100m, onto a thermally isolating surface. Assume that all mechanical energy is converted into the internal energy of the water. Find the change in temperature of water, ΔT. Specific heat capacity of water is 4.2 kJ/kg/K