Work and Energy

The KINETIC ENERGY (K) of a mass m moving with speed v is defined by $K \equiv (1/2)mv^2$ in units of Joules.

The WORK DONE BY A CONSTANT FORCE $\underline{\mathbf{F}}$ DURING A DISPLACEMENT $\underline{\Delta\mathbf{r}}$ is defined by $W_F \equiv |\underline{\mathbf{F}}|\Delta r_{_F}$ in units of Joules, where $\Delta r_{_F}$ is the component of $\underline{\Delta\mathbf{r}}$ in the direction of $\underline{\mathbf{F}}$. Equivalent expressions are $|\underline{\mathbf{F}}||\underline{\Delta\mathbf{r}}|cos(\theta)$ and $F_{_{\Delta r}}|\underline{\Delta\mathbf{r}}|$, where θ is the angle between $\underline{\mathbf{F}}$ and $\underline{\Delta\mathbf{r}}$, and $F_{_{\Delta r}}$ is the component of $\underline{\mathbf{F}}$ in the direction of $\underline{\Delta\mathbf{r}}$.

The CHANGE IN GRAVITATIONAL POTENTIAL ENERGY ΔU_G, for the system consisting of any object and the Earth, is defined as the opposite of the work done by gravity on that object (where the Earth is considered to be stationary).

The MECHANICAL ENERGY E_{mech} of the system consisting of any object and the Earth, is defined as the sum of the gravitational potential energy of the system and the kinetic energy of the object (where the Earth is considered to be stationary).