

Energy

- **Condition for scientifically work to be done**

1. **There must be a displacement**
2. Displacement must be along the direction of applied force

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- **When is no work done?**

1. **No displacement [No work is done in circular path]**
2. Displacement occurs perpendicularly to the applied force

Work = Force × Displacement [along force direction]

$$W = F \times s \text{ [Unit – Joule, } 1 \text{ J} = 1 \text{ N} \times 1 \text{ m]}$$

- **Work-Energy Relationship:**

- The ability to do work is called energy.
- Energy of the body is equal to the amount of work it can do when its energy is released.
- A Body possessing energy is only capable of doing work.

Energy: Unit – Joule

- **Kinetic energy** (because of motion): It depends on the mass and the speed of the body.

$$\text{Kinetic energy} = \frac{1}{2}mv^2$$

- **Potential energy** (Because of position and shape of the body). Potential energy = mgh [gravitational potential energy; h = height, g = acceleration due to gravity]
- **Mechanical energy:** A body is said to have mechanical energy if it possesses either kinetic energy or potential energy or both.
- **Various forms of energy are** Chemical energy, Sound energy, Light energy, heat energy, magnetic energy, and muscular energy.
- Grease and other lubricating substances are used to minimize the energy loss due to the friction.
- **Energy Chain:** The sun's energy reaches us through a series of conversions which is called energy chain i.e the interconversion of energy from one form to various other

forms.

- **Conservation of energy:** It states that energy cannot be created or destroyed. It can only be transformed from one form to another.
- **Thermal power plant** – Coal and petroleum are burned to produce steam by heating water to spin a turbine.
- Thermal power plant - Non renewable source.
- **Hydro power plants** use the potential energy of water accumulated at a height to spin a turbine.
- **Hydro power plant** – (Renewable source)
- **Problems** – Limited places for construction (only Hilly areas)