Energy

Energy is the capacity to do work. It exists in various forms, such as kinetic energy, potential energy, thermal energy, and more show figure (1).

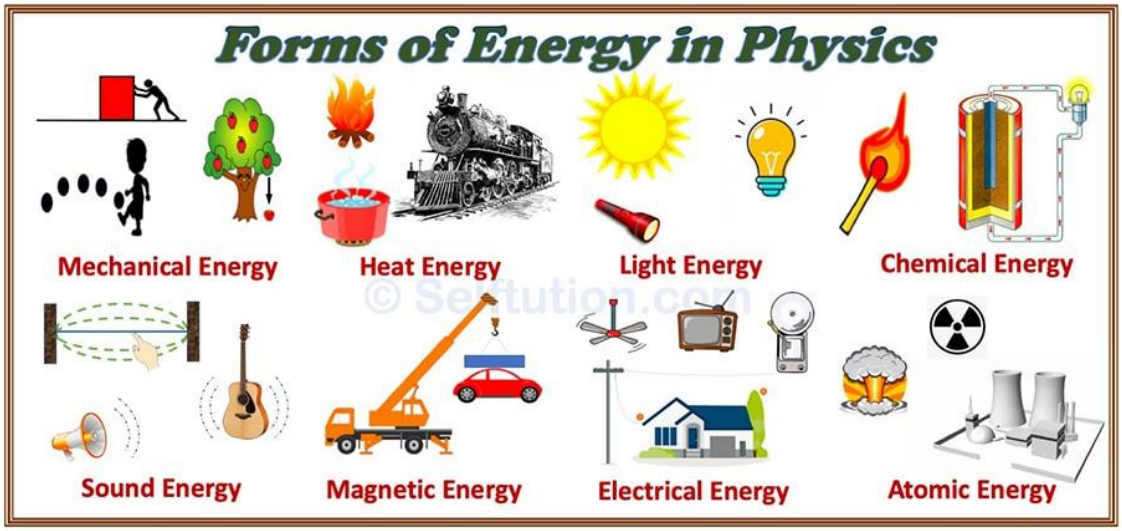


Figure (1) : Forms of Energy.

Kinetic Energy

Kinetic energy is the energy an object possesses due to its motion. It depends on both the mass of the object and its velocity. Any object in motion has kinetic energy, whether it's a rolling ball, a flying bird, or a moving car.

$$\text{K.E} = \frac{1}{2}\,\text{m}v^2$$

When Kinetic energy (K.E) measured in joules (J), mass (m) of the object measured in kilograms, Velocity of the object (v) measured in meters per second, m/s.

Work-Kinetic Energy Theorem

This theorem states that the net work done on an object is equal to the change in its kinetic energy.

$$W_{net} = \Delta \text{ K.E}$$

Power

Power is the rate at which work is done or energy is transferred over time. It quantifies how quickly energy is used or transferred.

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

When power measured in watts (W) or in J\s.

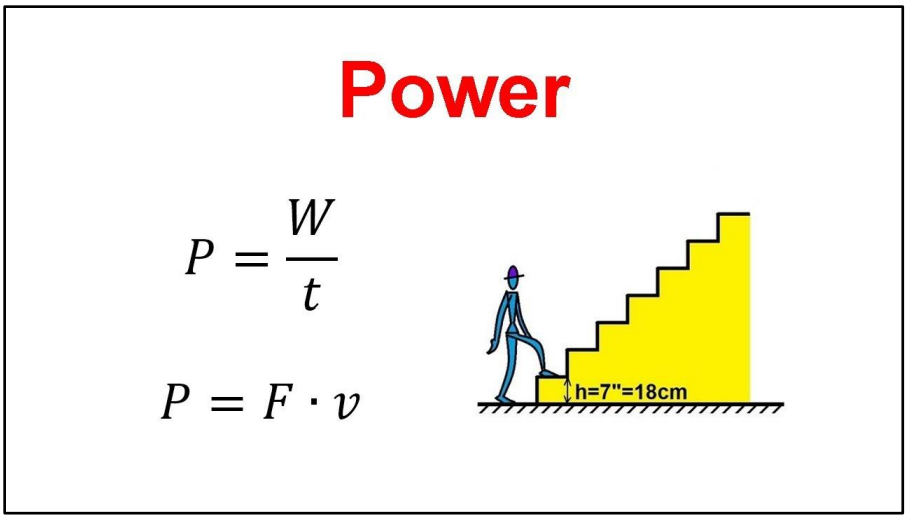


Figure (2): Show power equation.

Potential Energy

Potential energy is the energy stored in an object due to its position or configuration. It represents the potential to perform work as a result of the object's position in a force field, such as a gravitational or elastic force field.

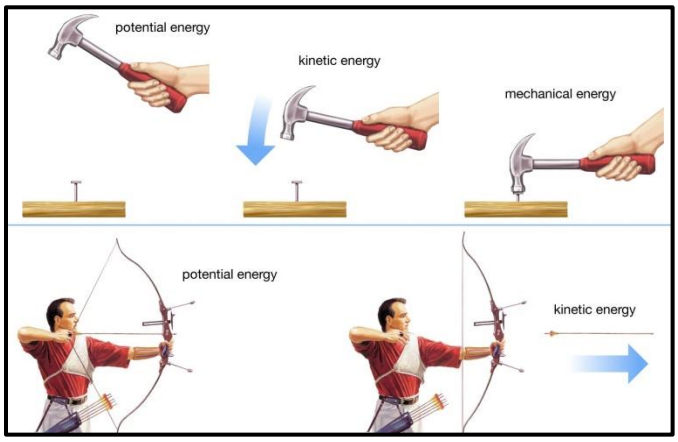


Figure (3): show difference between potential and kinetic energy.

$$\mathbf{P.E} = \boldsymbol{mgh}$$

When **P.E** measured in joules (j), **m** in kg , **g** in m\s^2 (9.81), h in meter (m).

Work-Potential Energy Theorem

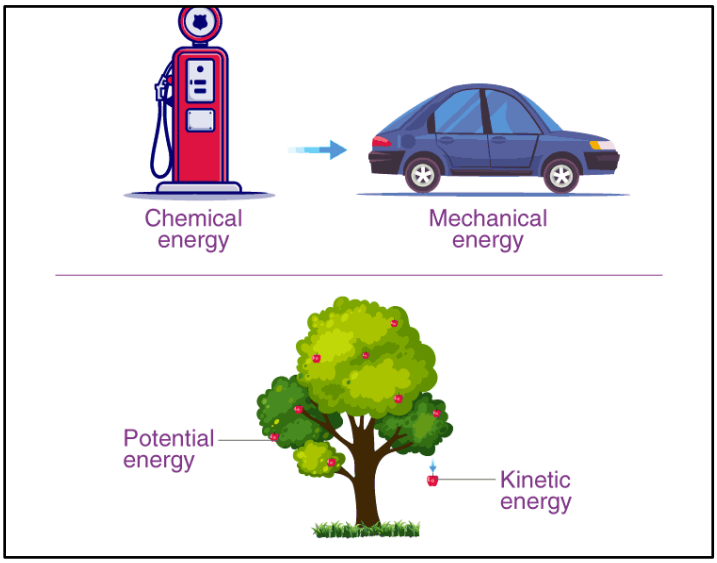
The net work done on an object by all forces is equal to the change in its potential energy (depending on the forces acting).

$$\boldsymbol{W_{net}} = \Delta\, \boldsymbol{P.E} = \boldsymbol{P.Ef} - \boldsymbol{P.Ei}$$

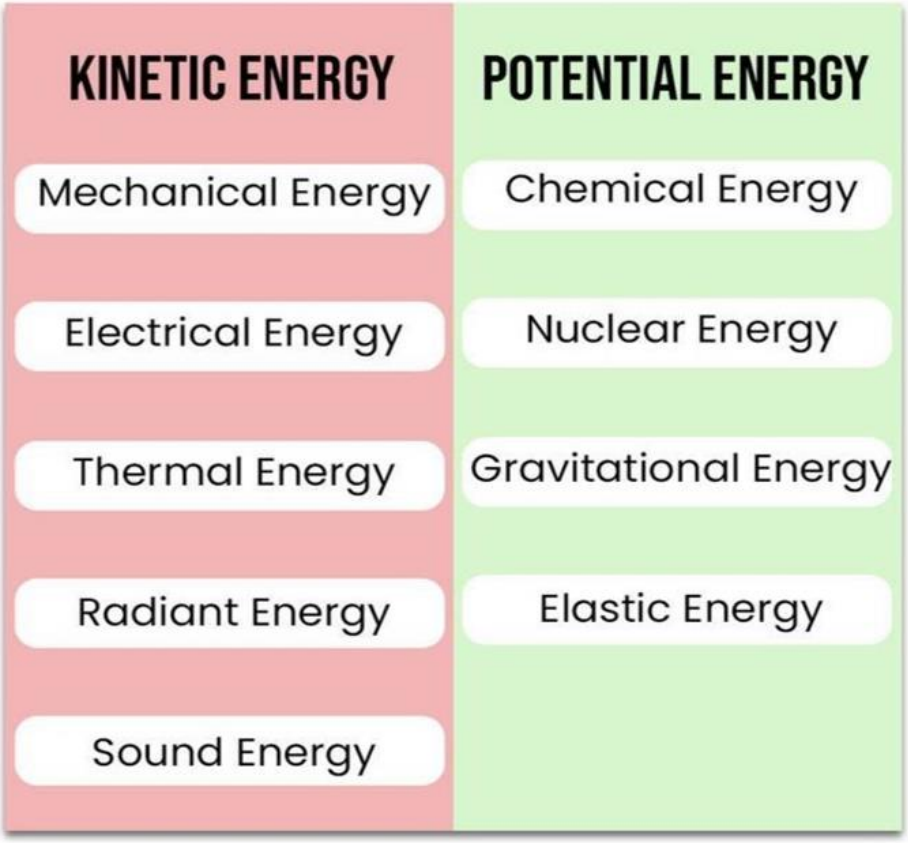
Conservation of energy

Conservation of energy is a fundamental principle in physics that states that energy cannot be created or destroyed, only transformed from one form to another. The total amount of energy in a closed system remains constant over time. This law applies to all physical processes and systems, and it is crucial in understanding the behavior of systems in classical mechanics, thermodynamics, and many other areas of physics.

$$E_T = K.E + P.E$$



Figure(4): Example of Energy Transformation.


KINETIC ENERGY
POTENTIAL ENERGY
Mechanical Energy
Chemical Energy
Electrical Energy
Nuclear Energy
Thermal Energy
Gravitational Energy
Radiant Energy
Elastic Energy
Sound Energy