Kinetic Energy

Kinetic energy is the energy an object possesses due to its motion. It depends on the mass (m) of the object and its velocity (v). The SI unit of kinetic energy is the Joule (J).

Formula:

- The kinetic energy (E_K) is given by the formula: $E_K = 1/2mv^2$
- Where m is the mass of the object in kilograms (kg) and v is its velocity in meters per second (m/s).

Example: A car with a mass of 1,000 kg is moving at a speed of 20 m/s. Calculate its kinetic energy.

given values:

- Mass, m=1,000 kg
- Velocity, v=20 m/s

Required values: KE=?

Solution: $E_K = 1/2mv^2$

$=12\times1{,}000\ kg\times(20m/s)^2$

$=1/2\times1{,}000\times400$

$=500\times400$

$E_K = 200{,}000J$

Result:

- The kinetic energy of the car is 200,000 Joules (J).

Potential Energy

Potential energy is the stored energy an object possesses due to its position or configuration. Common types include gravitational potential energy and elastic potential energy. However, in this section you are going to learn gravitational potential energy.

Gravitational Potential Energy (E_P)

Gravitational Potential Energy (E_P) is the energy stored in an object as a result of its vertical position or height above the ground. The SI unit of potential energy is the Joule (J).

- Formula: $E_P=mgh$

  Where

  - m = mass of the object (in kilograms)
  - g = acceleration due to gravity (9.8 m/s2^22 on Earth)
  - h = height above the ground (in meters)

Example: A 5 kg flower pot is placed on a shelf 2 meters above the ground. Calculate its gravitational potential energy.

given values:

- Mass, m=5 kg
- Height, h=2 m
- Acceleration due to gravity, g=9.8 m/s^2

Required values: $E_P=?$

Solution: $E_P=mgh$

$E_P=5\ kg \times 9.8\ m/s^2 \times 2\ m$

$E_P=98J$

Result:

- The gravitational potential energy of the flower pot is 98 Joules (J).