

# ⚡ Topic: Kinetic Energy & Potential Energy ⚡

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## ✅ A - Aim

To understand the definitions, formulas, and differences between **Kinetic Energy (KE)** and **Potential Energy (PE)**, and how they relate to the motion and position of an object.

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## 💡 C - Concept

- **Kinetic Energy (KE)** is the energy possessed by a body due to its **motion**.
  - **Potential Energy (PE)** is the energy possessed by a body due to its **position or configuration**.
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## ⚙️ H - How it works

- When an object is moving, it stores energy as **kinetic energy**.
  - When an object is at a height or under tension (like a spring), it stores **potential energy**.
  - Both are forms of **mechanical energy** and can be **converted** into one another.
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## 📊 E - Equations/Formulas

1. **Kinetic Energy (KE):**  
$$KE = \frac{1}{2}mv^2$$

(where  $m$  = mass in kg,  $v$  = velocity in m/s)
2. **Gravitational Potential Energy (PE):**  
$$PE = mgh$$

(where  $m$  = mass,  $g = 9.8 \text{ m/s}^2$ ,  $h$  = height)
3. **Units:**

- Energy is measured in **Joules (J)** for both KE and PE.

## S - Steps to solve problems

1. Identify whether the body is **moving** or **elevated/stored**.
2. Use the correct formula:
  - Moving → KEKEKE
  - At height or compressed → PEPEPE
3. Plug in values (mass, height, velocity, etc.).
4. Calculate and include **units** (Joules).
5. If needed, check for **energy conversion** (e.g., PE ↔ KE).

## E - Examples

### Example 1 (Kinetic Energy):

A 2 kg object is moving at 3 m/s. Find its kinetic energy.

**Sol:**

$$KE = \frac{1}{2}mv^2 = \frac{1}{2} \times 2 \times 3^2 = 9 \text{ J}$$

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### Example 2 (Potential Energy):

A 4 kg object is lifted to a height of 5 m. Find the potential energy.

**Sol:**

$$PE = mgh = 4 \times 9.8 \times 5 = 196 \text{ J}$$

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