🌟 Topic: Work and Energy 🌟

✅ A - Aim

To understand the concepts of **Work**, **Energy**, and their interrelation, including types of energy, the Work-Energy Theorem, and the Law of Conservation of Energy.

💡 C - Concept

- **Work** is said to be done when a force is applied on an object and it causes displacement.
- **Energy** is the capacity to do work.
- **Power** is the rate of doing work.

⚙️ H - How it works

- If you apply a force to move an object and it moves **in the direction of the force**, **work is done**.
- Energy can be of different forms – **kinetic**, **potential**, **mechanical**, **thermal**, etc.
- Energy is **conserved** – it can neither be created nor destroyed, only **transformed**.

🧮 E - Equations/Formulas

1. **Work**:
   $W = \vec{F} \cdot \vec{d} = Fd\cos\theta$
   (where F = force, d = displacement, θ = angle between force and displacement)

2. **Kinetic Energy**:
   KE=12mv2KE = \frac{1}{2}mv^2KE=21mv2

3. **Potential Energy (gravitational)**:
   PE=mghPE = mghPE=mgh

4. **Work-Energy Theorem**:
   W=ΔKEW = \Delta KEW=ΔKE

5. **Power**:
   P=WtP = \frac{W}{t}P=tW

6. **Unit**:
   - Work/Energy: **Joule (J)**
   - Power: **Watt (W)**

🔢 S - Steps to solve problems

1. **Identify** the forces acting and displacement.
2. Check if **angle θ\thetaθ** between force and displacement is involved.
3. Use the formula for **Work** or **Energy** as per the problem type.
4. For energy conversion problems, apply **conservation laws**.
5. Use appropriate **units** and verify the final answer.

📘 E - Example

Q: A 5 kg object is lifted to a height of 10 m. Find the work done and potential energy gained.
Sol:

- W=PE=mghW = PE = mghW=PE=mgh
- =5×9.8×10=490 J= 5 \times 9.8 \times 10 = 490 \text{ J}=5×9.8×10=490 J

- **Ans**: Work Done = 490 J, Potential Energy = 490 J