Work, Energy & Power

Work

Work is done when energy is Transferred

$$Work = F \times d$$

d → distance in the direction of the force

- Measured in J (Joules) - Nm

Energy

Energy is the ability to do Work

- It can do work but doesn't mean it did. **e.g.** : A rock that might fall off a mountain has energy but did not do any work yet

Forms of energy

1. Heat / Thermal
2. Chemical
3. Electric
4. Sound
5. Light
6. Kinetic
7. Potential
    1. Gravitational
    2. Strain
    3. Electric

Potential Energy (Energy of Position)

Gravitational

$$G.P.E. = mgh$$

- Proof

    $work = F \times d$
    $work = m \times g \times h$

- **h** is considered to be at the **center of mass**

Kinetic Energy (Energy of Motion)

$$K.E. = \frac{1}{2}mv^2$$

- Proof

    $K.E. = F \times S$

    $K.E. = m \times a \times S$
    $v^2 = 2aS$
    $K.E. = \frac{1}{2}mv^2$

Power

Power is the **rate** of doing work

$$P = \frac{work}{time}$$

$P = F \times v$

- Measured in W (Watt) - Nms^{-1}

Efficiency (η)

Efficiency is the **useful** output power percentage

$$\eta = \frac{\text{useful output energy}}{\text{input energy}} \times 100$$