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# Work-Energy and Power: What is Work, Law of Conservation of Energy (For CBSE, ICSE, IAS, NET, NRA 2022)

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- Work, power, and energy are among the most important concepts of mechanics.
- Work, energy, and power are the most used terms in Physics. They are probably the first thing you learn in your Physics class.
- A moving car, walking upstairs, lifting heavy objects, an aeroplane flying, etc. are among the most common examples that give us insight into the concept of work, power, and energy.
- Work and energy can be considered as two sides of the same coin. In this article, we will learn all about the concept of work, power, and energy.
- There are few common notions of work, power, and energy that can be precisely defined in physics.
- Notions and measurements can be utilized to define and predict the motion and behavior of bodies.

What is Work, Energy and Power?	
Work	
<b>Definition</b>	Work is said to be done when a force applied to an object moves that object.
<b>Formula</b>	We can calculate work by multiplying the force by the movement of the object. $W = F \times d$
<b>Unit</b>	The SI unit of work is the joule (J)
Energy	
<b>Definition</b>	In physics, we can define energy as the capacity to do work.
<b>Formula</b>	For the potential energy the formula is

	P. E. = $mgh$
<b>Unit</b>	The SI unit of energy is joules (J) , which is named in honour of James Prescott Joule.
Power	
<b>Definition</b>	Power can be defined as the rate at which work is done i.e.. energy converted.
<b>Formula</b>	The formula for power is $P = W/t$
<b>Unit</b>	The unit of power is watt (W) .
<i>The Work Energy and Power</i>	

## What is Work?

Work is the measurement of energy transfer that takes place when an object is displaced by an external force applied in the direction of the displacement.

$$\text{Work} = \text{Force} \times \text{Displacement} = F \times d$$

## What is Power?

The rate of doing work is called power.

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

## What is Energy?

- The capacity for doing work is called Energy.
- All forms of energy are either kinetic or potential.
- The energy in motion is known as Kinetic Energy whereas Potential Energy is the energy stored in an object and is measured by the amount of work done.
- It may exist in kinetic, potential, thermal, chemical, electrical, nuclear, or various other forms. The SI unit of energy is the same as that of work.

## Types of Energy

- Mechanical energy
- Mechanical wave energy
- Chemical energy
- Electric energy

- Magnetic energy
- Radiant energy
- Nuclear energy
- Ionization energy
- Elastic energy
- Gravitational energy
- Thermal energy
- Heat Energy

## **What is the Principle of Conservation of Energy?**

Principle related to the conservation of mechanical energy states that the total mechanical energy of a substance remains in equilibrium if the only forces acting upon the body are conservative in nature.

## **Law of Conservation of Energy**

- Energy can neither be created nor be destroyed So, it can be changed from one to another form.
- Total energy in an isolated system remains the same or energy is conserved over time.
- Mass remains the same in any closed system within boundaries except for the heat form which can cross boundaries.
- Energy cannot be created and neither can be destructed but conveniently can be changed to different forms.
- Chemical energy can be converted into heat energy which could further be used to generate potential energy in a different body.
- As energy is changed from one to another form, net gain/loss remains the same.
- So, energy is said to be conserved wherein the total amount remains the same.

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