

# 10<sup>th</sup> Class

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## ➤ ELECTRIC POTENTIAL:

### 1. Definition:

- Electric potential is the amount of electric potential energy per unit charge at a point in an electric field.

### 2. Symbol and Unit:

- Symbol:  $V$
- Unit: Volt ( $V$ )

### 3. Mathematical Expression:

- $V = W/Q$
- Where  $V$  is the electric potential,  $W$  is the electric potential energy, and  $Q$  is the charge.

### 4. Scalar Quantity:

- Electric potential is a scalar quantity, meaning it has magnitude but no direction.

## ➤ POTENTIAL DIFFERENCE:

### 1. Definition:

- Potential difference, also known as voltage, is the difference in electric potential between two points in an electric field.

### 2. Symbol and Unit:

- Symbol:  $V$  (same as electric potential)
- Unit: Volt ( $V$ )

### 3. Mathematical Expression:

- $V = W/Q$
- Where  $V$  is the potential difference,  $W$  is the work done to move a charge, and  $Q$  is the charge.

### 4. Direction and Polarity:

- Potential difference has direction and polarity.
- It is positive when moving from a point of lower potential to a point of higher potential.
- It is negative when moving from a point of higher potential to a point of lower potential.

## ➤ CONNECTION TO ELECTRIC CIRCUITS:

### 1. Battery and Cells:

- Batteries and cells provide a potential difference in an electric circuit.

- They create an electric field that causes charges to flow through the circuit.

## 2. **Resistance:**

- Resistance in a circuit causes a drop in potential difference across the resistor.
- Ohm's Law ( $V=IR$ ) relates potential difference, current, and resistance in a circuit.

## ➤ **APPLICATIONS:**

### 1. **Household Electricity:**

- The potential difference supplied by power plants is used to power household appliances and lighting.

### 2. **Electronic Devices:**

- Potential difference is essential for the operation of electronic devices such as smartphones, computers, and televisions.

### 3. **Electrochemical Cells:**

- Cells and batteries use chemical reactions to create a potential difference, providing portable power sources.

### 4. **Power Transmission:**

- High-voltage transmission lines use large potential differences to transmit electricity over long distances efficiently.

Understanding electric potential and potential difference is fundamental to understanding electricity and its applications in various fields. These concepts are essential for understanding electric circuits, electronics, and electrical engineering principles.