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Current Electricity

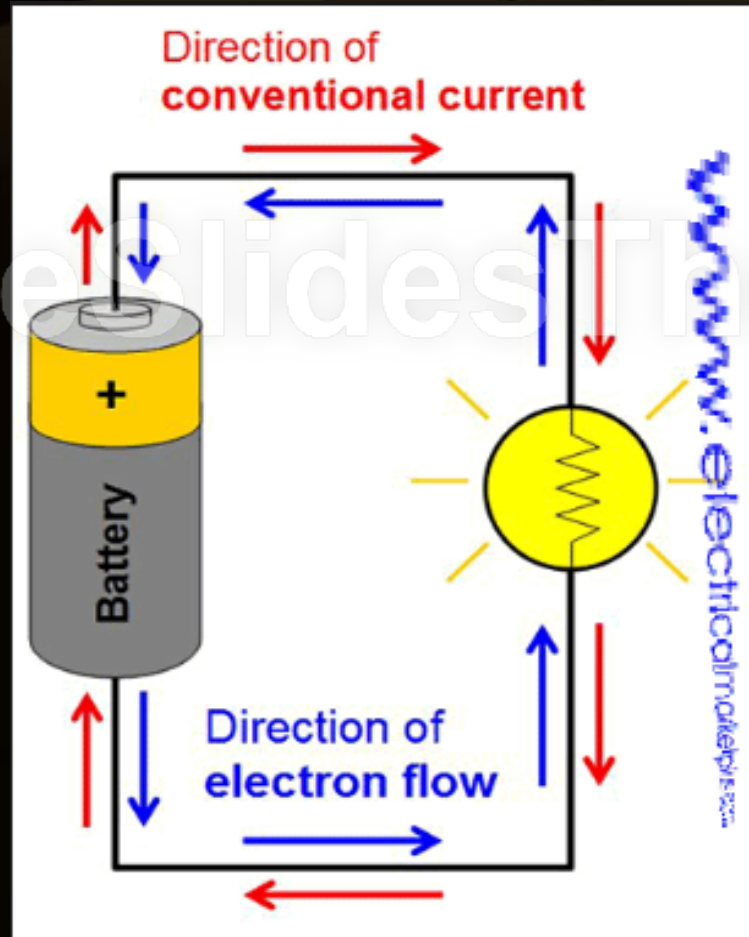


Electron Flow

- The lamp in a circuit lights up because there are electrons moving from one terminal of the battery to the other terminal
- There must be a conducting path between the lamp and the battery
- Although the free electrons flow from the negative terminal to the positive terminal of the battery
- We use the conventional current direction (from positive to negative terminal of the battery).

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Electron Flow



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Electric current

- Electric current is the rate of flow of charge. In wires, these charges are electrons.
- The charge is measured in Coulombs(C) therefore current is measured in C/S or Amperes(A).

$$\text{Current}(I) = \text{Charge}(Q) / \text{Time}(t)$$

Potential Difference

- It is the energy transferred per unit and it is measured in Volt(V) where 1 Volt is 1 J/C (joule per coulomb)

$$\text{Voltage}(V) = \frac{\text{energy transferred}(J)}{\text{Charge}(Q)}$$

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Resistance

- The resistance of a component is what causes a voltage drop (potential difference) across the component.
- If there is a P.D across a conductor , a current flows through it.
- Resistance is measured in Ohms .
- The resistance of a conductor is the ratio of the P>D applied across it , to current passing through it .

$$\text{Resistance}(R) = \text{Volts}(V) / \text{Current}(I)$$



Resistance of a Wire

1. The Resistance of a wire :
2. Increases with the length(L)
3. Increase as the cross-section area(A) decreases
4. Depends on the Resistivity(ρ) of the material (which varies from one to another)
5. Depends on the temperature such that :
 1. Metallic conductors show increase in resistance as temperature increases.
 2. Non-Metallic is vice-versa

How Resistance is measured

- To find the resistance of a wire you must place it in a circuit .
- The voltmeter tells you the P.D across the wire .
- The Ammeter tell you the current across it .
- Calculate the resistance using $R=V/I$.

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Series and Parallel circuits

- Series Circuits:
 - The same current flows through all parts of the circuit.
 1. The size of the current is determined by the P.D of the cells and the total resistance of the circuit($I=V/R$)
 2. The bigger the resistance of a component , the bigger its share of the total P.D
 3. The total P.D of the supply is shared between the various components , so the voltages round a series circuit always add up to equal the total voltage of supply.



Series and Parallel circuits

- Parallel Circuits:

1. The voltage is the same across all components.
2. The current through each component depends on the resistance
3. The total current flowing around the circuit is equal to the total of all currents in the separate branches.

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