Charge & Current

12PHYS - Electricity

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Starter

1. Define electric field
2. Draw a uniform electric field between two plates. Make the top plate **negatively charged**
3. Describe the motion of a negatively charged object in the electric field
4. If the negative charge moves towards the negative plate, does it gain or lose electric potential energy?

Question: What are some common carriers of charge?

Answer

Electrons are the charge carriers in metals, ions in solution, electrically charged gas in plasma.

Conductors

A conductor is a material through which charge can move freely.

e.g. electrons move through metal

Current

Current is the flow of charge (often electrons).

It is the measure of the rate at which the charge flows (Amperes).

Recall: $1C$ of charge is 6.25×10^{18} electrons

$$I = \frac{q}{t}$$

I = current measured in what?

q = charge measure in what?

t = time measured in what?

Examples

1. If $10A$ flows through a wire, how much charge passes a point in $5s$?
2. A total charge of $0.12C$ passes a point in $5s$. What is the current?
3. $20C$ of charge passed through a light bulb in $4s$. What was the current?
4. $0.02C$ of charge passed through a resistor in 1 minute. What was the current?
5. If the current is $0.3A$, how much charge will pass a point in 10 minutes?

What Direction Does Current Flow?

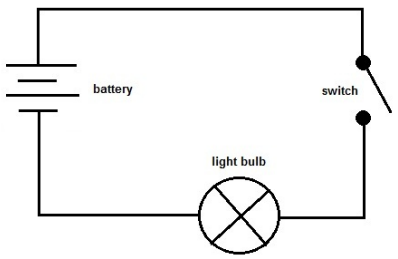

Figure 1: Circuit Diagram

Conventional Current

Conventional current is the direction that positive charges move in a circuit. From the positive terminal to the negative terminal.

However, electrons actually move from the negative terminal to the positive terminal, which is **opposite** to *conventional current*.