

Electric Current Notes

I. Potential difference: the difference in potential energy between any two places in the circuit, measured in volts (V), using a volt meter. It compares how much energy electrons have in a circuit between any two points.

II. Current: the number of electrons that pass by a given point in a circuit in a given period of time, measured in amperes (A), using an ammeter.

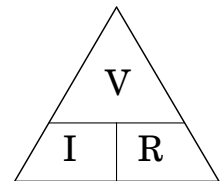
A.Types:

1. AC (alternating current): current that reverses direction multiple times each second. Wall outlets supply AC at 60Hz (Hertz). The current reverses direction 60 times a second. Most devices around the home that plug into outlets use AC.
2. DC (direct current): current that flows in only one direction through a circuit. Batteries provide DC. Many portable electrical devices can use batteries. Some electronic devices like computers, need DC. So do cars, planes, and small boats.

III. Resistance: the tendency for a material to oppose the flow of electrons, measured in ohms (Ω), using an ohmmeter. The length and thickness of a conductor affects its resistance. Resistance increases the longer the conductor or the thinner the conductor and vice versa. The thin wires in a toaster have a high resistance to electron flow causing the electrons to give up their energy in the form of heat.

IV. Ohms Law: shows the relationship between the three measurable quantities of electric circuits, abbreviated V, I and R. (Refer to the triangle formula at right)

Ohm's law: potential difference = current \times resistance
 $V(\text{volts}) = I(\text{amperes}) \times R(\text{resistance})$



V. Electric circuit: A path through which electrons can flow through a conductor. A path not having any gaps in it that allows electron flow is called a closed circuit. A path with one or more gaps is called an open circuit and electrons will not flow through it. In order for electrons to flow in a closed circuit, they need some sort of device that maintains a potential difference such as a battery.

VI. Batteries: a device to maintain a potential difference in a circuit. As electrons in the circuit move through the conductor or a device in the circuit they lose energy. The battery supplies new energy to the electrons but eventually it will exhaust itself and will need to be either recharged or replaced.

1. Dry cell: typically consists of a zinc container (-) filled with an electrolytic paste with a carbon rod in the center (+). Current is produced when the zinc reacts with chemicals in the paste. Flashlights and portable CD players use this type of battery.

2. Wet cell: two different metal plates immersed in a liquid electrolyte solution. In a car battery, the electrolyte is sulfuric acid and the metal plates are lead and lead dioxide.

VII. Corrosion: whenever two different metals are in a moist electrolyte, current can flow. However, the metals began to breakdown or corrode. This is why cars rust in areas where salt is applied to melt road ice.