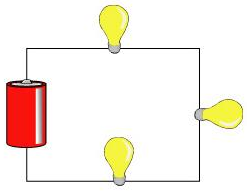
Vocabulary

ampere (amp) - the basic unit of current. It is abbreviated A.

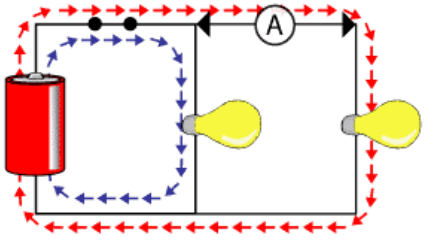
battery (as opposed to dry cell) - a power source containing two different metals inserted into a conducting solution. The metals have an electronic potential difference between them. One metal is more likely to release electrons, and the other is more likely to receive electrons. A 12-volt car battery is a good example of a true battery. The conducting solution inside it is sulfuric acid. The so-called "batteries" we use in flashlights, calculators, and CD players are actually dry cells.

circuit – a closed path through which current flows. Parts of a circuit include a power source, conducting wire, various devices that have loads (resistance to current flow), and a switch or switches. Usually insulating materials (around the wire) and circuit protection devices (resistors and fuses or circuit breakers) are also found in circuits.

series circuit – circuit with only one path for electricity.



parallel circuit – a circuit with multiple paths for the flow of electrons. In the image, current in one circuit path is represented by blue arrows and the other circuit path is shown by red arrows**.**



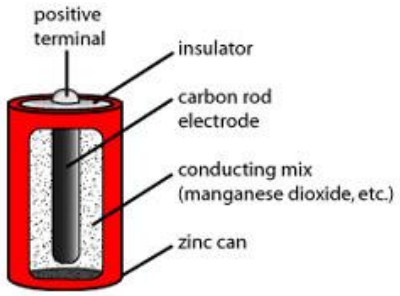
current – the rate of flow of charge through a circuit. Current is abbreviated *I*. The unit of current is the ampere, or amp, abbreviated A. An amp is one coulomb/second (C/s), which is equal to the movement of 6.24 x 10^{18} electrons/second. The definition of current arose from a guess made about the direction of movement of positive charge. It turned out that what actually happens is the movement of negative charge (electrons) in the opposite direction. Either way, the result is the same - electricity!

alternating current – is current in power lines and normal household electricity that comes from a wall outlet. The direction of the flow of electrons switches back and forth at regular intervals or cycles. The standard current used in the U.S. has a frequency of 60 cycles per second (or 60 Hertz); in Europe and most other parts of the world its frequency is 50 cycles per second (or 50 Hz.) – which is the reason we need transformers for many of our electrical devices when we travel outside of the United States. One advantage of alternating current is that it is relatively cheap to change the voltage of the current. Also, the loss of energy that occurs when current is carried over long distances is far smaller with alternating current than with direct current. In the US, lighting and low-power appliances run at 120 volts plus or minus 10% although, US houses get 240 volts he panel. Certain appliances (e.g., air conditioners, electric stoves, and clothes dryers) require more power and you'll notice that the outlets have holes for differently shaped plugs than most appliances like lamps, TVs, and etc.

direct current (DC) – is electrical current which flows consistently in one direction. The current that flows in a flashlight or another appliance running on dry cell or batteries is direct current.

diode – a device that allows electricity to flow in only one direction. Diodes prevent the flow of current when hooked up to a circuit in the wrong direction.

dry cell – a portable power source similar to a battery, but with a paste rather than a liquid between the two metal plates of the dry cell. The D, C, AA, and AAA "batteries" with which we are familiar are actually combinations of 1.5 V dry cells. Voltages greater than 1.5 V are gained by wiring the cells in series. Wiring dry cells in parallel does not change the voltage, but it can result in a greater number of electrons available to flow and longer battery life.

Cross section image of a dry cell.	

light emitting diode – a lamp that gives off light of a particular wavelength when current runs through it, thus converting electrical energy to light energy. It is abbreviated LED. Each wavelength produces a characteristic color. Red LEDs are commonly used in electric devices to show that the device is turned on.

load – the amount by which a device resists the flow of electric current. Lightbulbs,

motors, fans, buzzers, resistors, etc., all have loads. Wires and batteries are not considered to have loads (although they have very small resistances).

ohm – a unit of resistance. The ohm is abbreviated Ω, the capitalized Greek letter omega.

Ohm's law – the law that relates voltage, current, and resistance in conductors. Ohm's law is expressed as :

Voltage = Current x Resistance, or Resistance = Voltage / Current, or Current =

Voltage / Resistance

or $V = I R$ or $R = V / I$ or $I = V / R$

where V = voltage, R = resistance, and I = current

power – the rate at which work is done or energy is transformed. Power is abbreviated P. One unit of power is the watt (abbreviated W). Another unit of power is the joule/second (abbreviated J/s). The initial unit for power was the horsepower, abbreviated HP. 1 horsepower = 746 watts.

Power = Energy / Time or $P = E / t$

OR

Power = Current x Voltage or $P = I \times V$

For example, 1 amp x 1 volt = 1 watt of power.

resistance – the opposition to the flow of electrons, with the conversion of some electrical energy into heat energy (heat). The unit of resistance is the ohm, abbreviated Ω, which is the capitalized Greek letter, omega (the last letter of the Greek alphabet). Resistance in objects like motors is called "impedance" because the device impedes (interferes with) the flow of electric current. Whether you call it resistance or impedance, the result is the same!

Resistance of conductors is affected by four factors in particular: cross -sectional area of wire, length of wire, temperature, and resistivity (specific resistance) of the material. Resistance of a material is directly proportional to its length (as length increases, resistance increases). Resistance is inversely proportional to cross-sectional area (as the thickness of a wire increases, the resistance decreases). Thus, short and fat wires have less resistance than long and thin wires. A practical application for this is to use thick wires to move large currents. Thus, power plants are more efficient if kept close to their users.

switch – a wired device that will either open (turn OFF) or close (turn ON) a circuit, depending on the switch position.

voltage – an electrical potential difference between the two metals in a dry cell or battery power source. This potential difference forces electrons to flow. Voltage is abbreviated *V*. Voltage can be described as the force that pushes electrons. The size of the power source determines how many electrons (and thus how much current) is available to flow. The unit of voltage is the volt, V.

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