Electricity: Part 3

Keyterms: Ohm's Law, series circuit, parallel circuit, electrical power

0Voltage, Resistance, and Current (Ohm's Law)

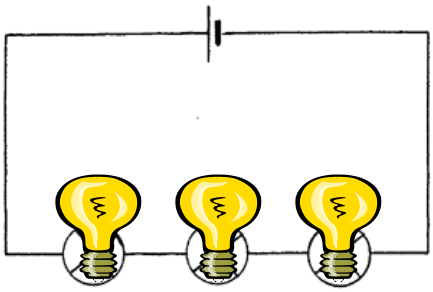
When you connect a conductor (wire) and a device (light bulb) to the + and – terminals on a battery an electrical current flows. The amount of current depends on the amount of voltage supplied. The current around the circuit also depends on the resistance of the wire and the amount of devices in the circuit. This relationship of voltage, current, and resistance is known as Ohm's Law.

Voltage = current × resistance

$$V = IR$$

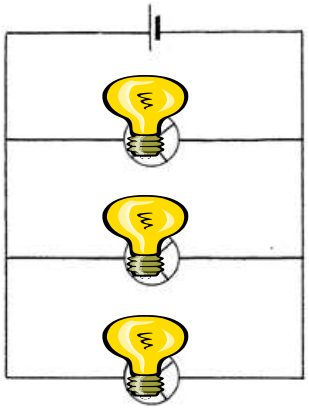
Series Circuit

All circuits in this world are series, parallel, or a combination of series and parallel. A series circuit is a circuit that has only one path for the electric current to flow. If this path for the electricity is broken, the current will no longer flow and all the devices in the circuit will stop working. An example of a series circuit are the typical Christmas tree lights that come in a string. The current decreases as it passes each device because each device is taking electrons away from the current in order to run.



Parallel Circuit

Parallel on the other hand have multiple paths that the current can travel through. If one of the devices or one of the paths is broken, then the current can still travel if there is at least one path back to the power source. Most circuits you experience are parallel or a combination of series and parallel, like your house, vehicle, this classroom, etc. If one of the devices is broken or removed the electricity still has other paths to take back to the power source so the current is uninterrupted



Fuses

When you keep adding devices to a circuit (TV, microwave, hair dryer, computer, etc. etc.) the amount of current the circuit demands increases. The more current there is running through a circuit the more heat there is. To prevent either a fire or explosion a fuse or circuit breaker is installed to stop/break the flow of electricity through the circuit. In a house if the current becomes more than 15 A to 20 A then the fuse pops and the electricity stops.

Electrical Power

Electric Power is used in many ways to do useful work. Household appliances convert electric energy to heat, or sound, or mechanical energy. The rate at which an appliance converts electrical energy to another form of energy is called power. The unit for electrical power is the watt (W). Sometimes it is convenient to express electrical power in kilowatts (kW). 1 kilowatt = 1000 watts.

Power = current × voltage

$$P = IV$$

In a normal household a current of about 1 A flows through the circuit. TVs, stereos, refrigerators, etc. require about 120 V of voltage from the wall outlet. So that means the power that it needs is 120 W.

Section 3 Review Questions

1.) As the resistance in a simple circuit increase, what happens to the circuit?

2.) What is the difference between a series circuit and a parallel circuit?

3.) Explain why you should avoid handling electrical appliances when standing on wet ground?