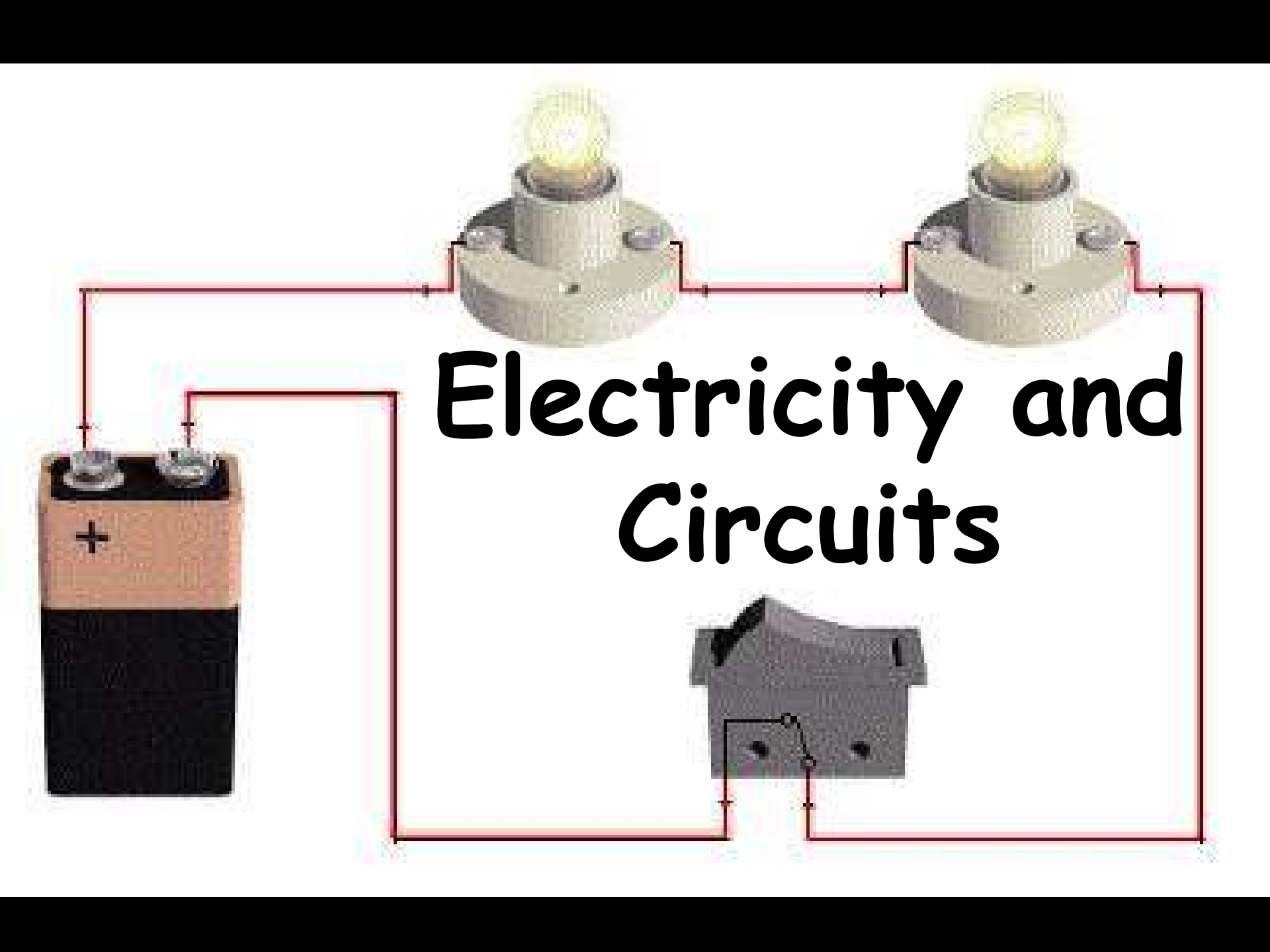
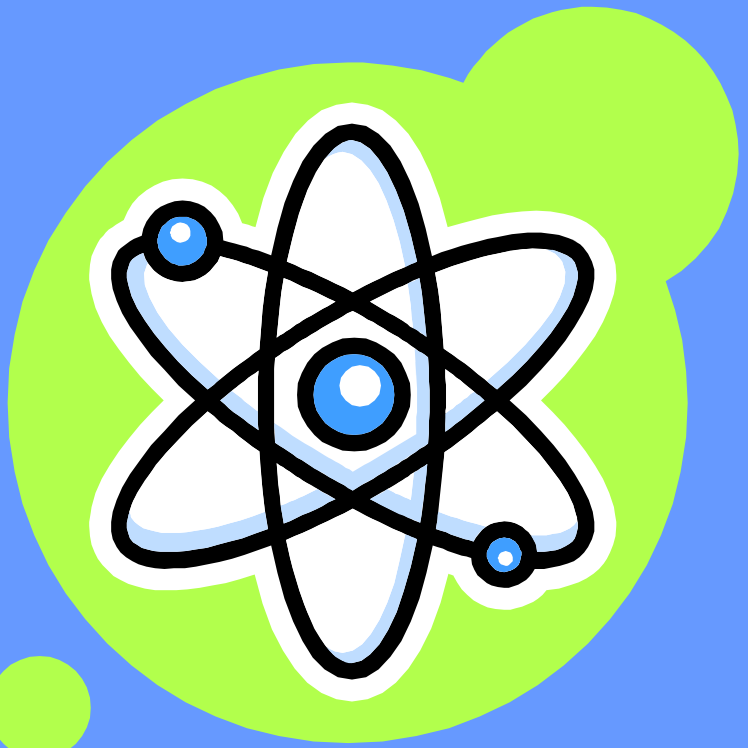

Electricity and Circuits

Electric Charges

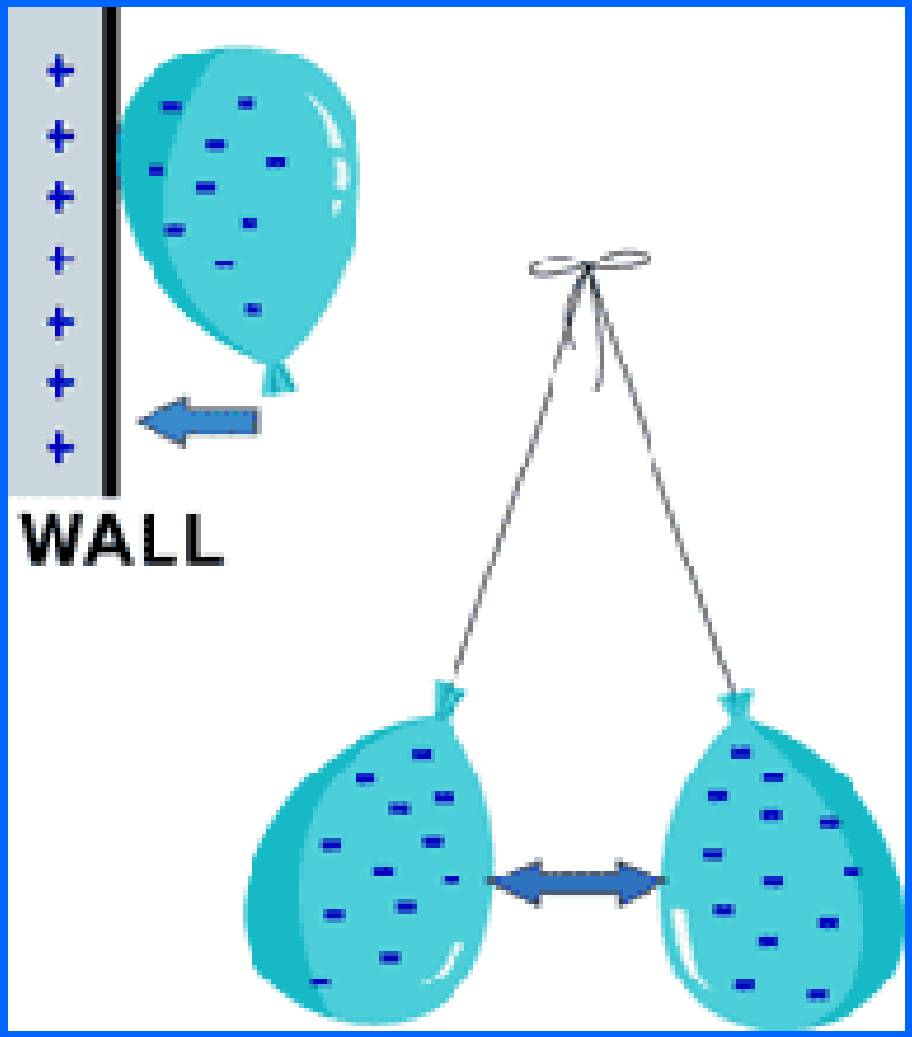
- Three particles that make up an atom:
  - Protons — POSITIVE
  - Neutrons — NEUTRAL
  - Electrons — NEGATIVE



The Flow of Charges

- Which subatomic particle can move from one object to another?
  - Electrons!
- What does the addition of electrons do to the charge of an object?
  - The object will become NEGATIVELY charged.
- What does the removal of electrons do to the charge of an object?
  - The object will become POSITIVELY charged.

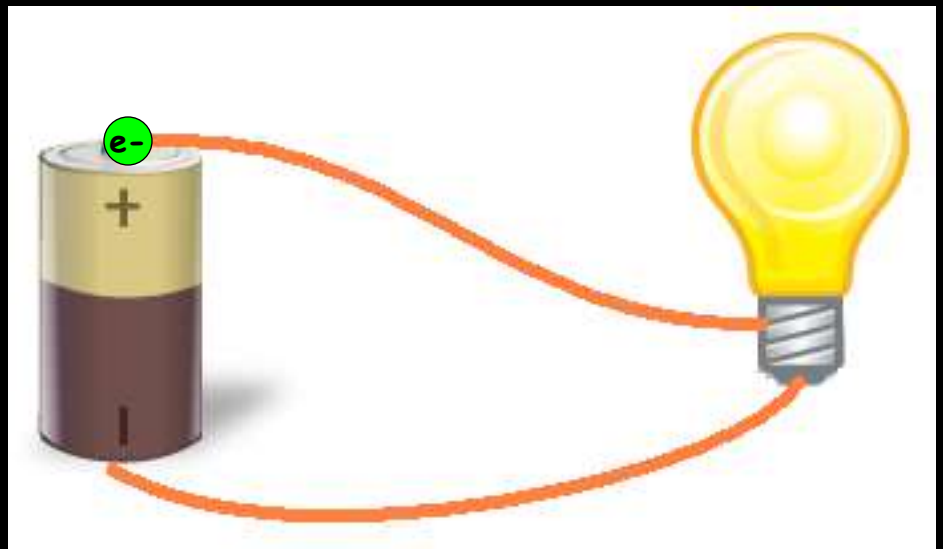
How Charges Interact



- When two objects with the SAME charge come into contact, they repel.
- When two objects with DIFFERENT charges come into contact, they attract.

Electric Current

- What is an electric current?
  - The continuous flow of electric charges through a material.
- What is the unit of measurement for current?
  - amperes (A) or amps: the amount of charge flowing past a point in a certain amount of time.



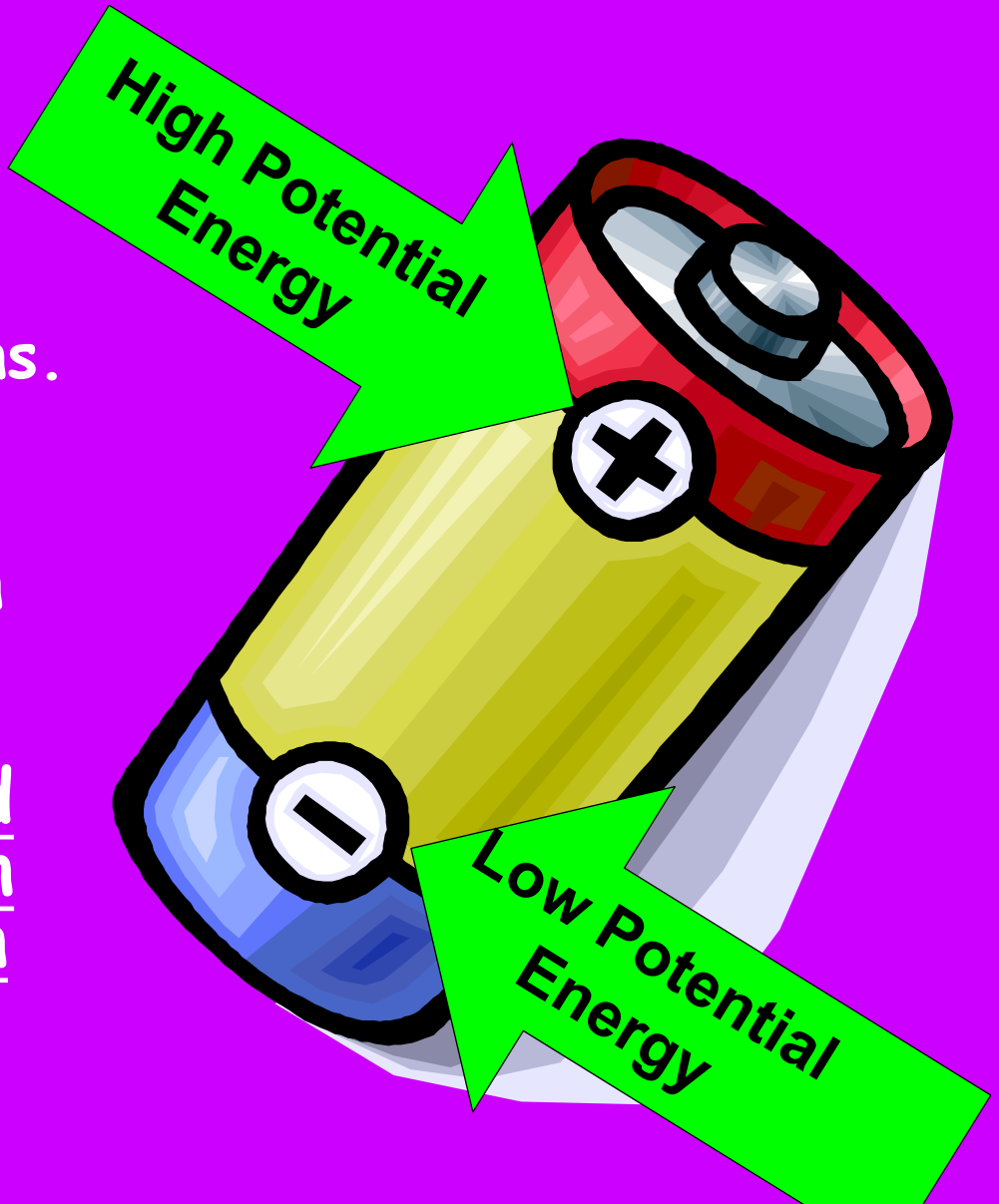
Potential Difference

- What's potential energy (PE)?
- On a roller coaster, where does the car have more potential energy?
- Can the car move from an area of low PE to high PE without the help of a motor?

- It's the same for electric current!
  - The charges in a current are like the roller coaster cars.
  - The track is like the wires.
  - The motor that gets the cars to the top of the first hill is like the battery.

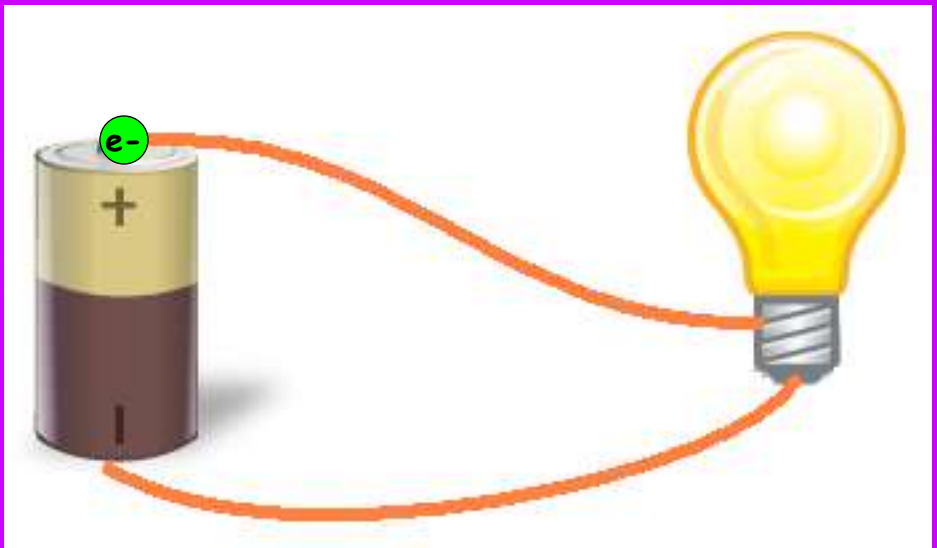
Potential Difference Cont.

- So what is Potential Difference?
  - The difference in potential energy between two locations.
- The difference between a rollercoaster and an electric current is that the potential difference is caused by the difference in electrical charges in two locations, not height.



Potential Difference Cont.

- Electric charges will always flow from a region of __high__ potential energy to a region of __low__ potential energy.
- When the charge reaches the positive terminal and enters the battery, it gains electric potential energy as it travels through the battery to the negative terminal.



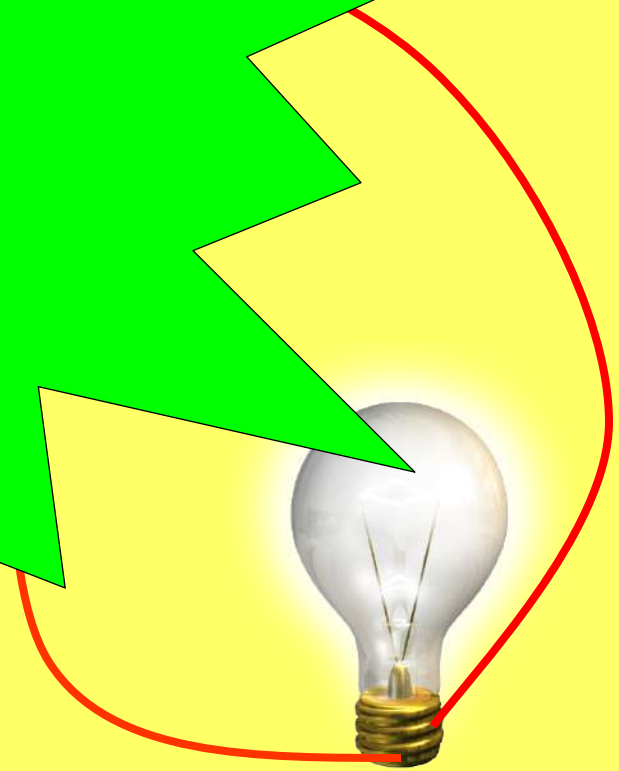
Voltage

- What is it?
  - Another term for potential difference.
- What unit is used to measure voltage?
  - Volts (V)
- So in a 9-volt battery, when an electric charge moves from the negative terminal, through the battery, to the positive terminal, how much potential energy does the charge gain?
  - 9 volts!

Basic Circuits

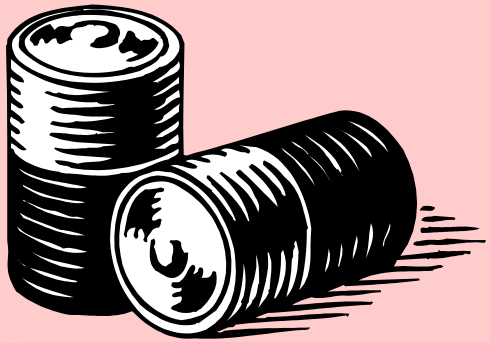
- A circ… is a …
  through …
- M…
  thr…
  – …
  – …es)
  that …nect the two

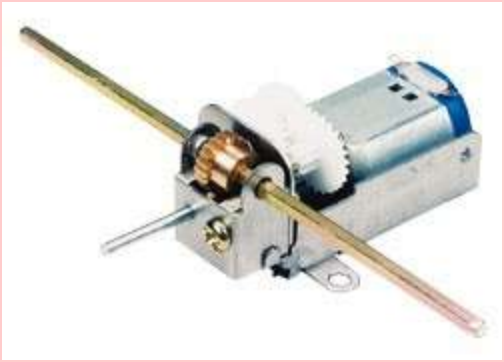
Create a basic circuit. Use only a battery, two wires, and a bulb. Draw your circuit on your notes page.

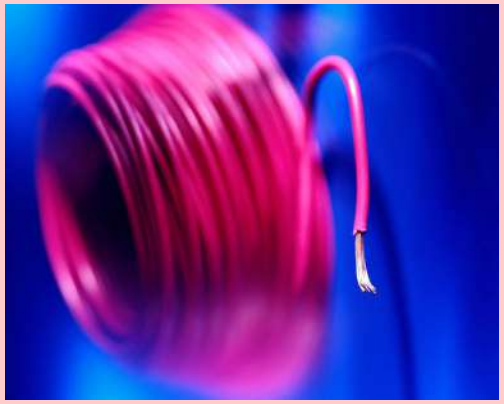


Parts of a Circuit

- Energy Source – A circuit needs an energy source to push a charge through the circuit.
  - Examples?
- Load – a load is a device in a circuit that operates using electrical energy.
  - Examples?
- Conductor – a conductor is a material that allows electrical energy to flow through it easily.
  - What makes a good conductor?
  - Examples?

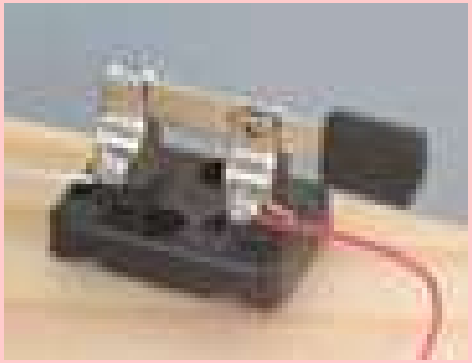






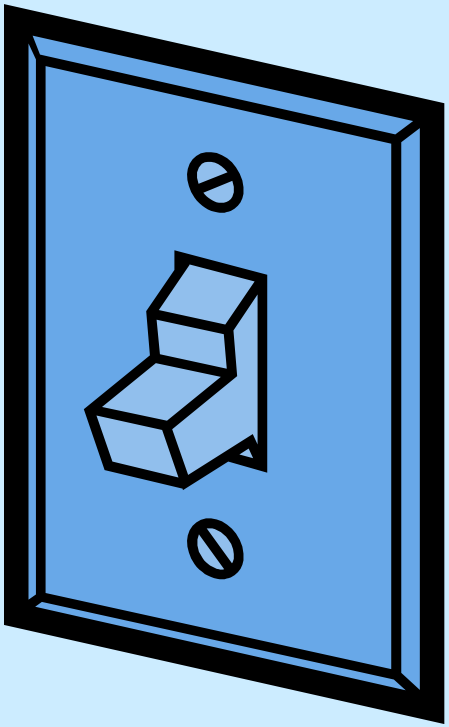
Parts of a Circuit Cont.

- Resistor – a resistor is an object added to a circuit that restricts the flow of electrical energy.
  - Resistors inhibit the flow of electric current by producing a voltage drop when current passes through them. They limit current and cause some electric energy to be given off as heat.
  - Examples?
- Switch - a switch is a device that is used to control the flow of current through a circuit.
  - A switch works by separating (open) or bringing together (closed) two conductors attached to a circuit.



Circuit Switches

- **Add a switch to your circuit. See what happens when you open and close the switch.**
- **On your notes, draw a circuit with an open switch and a closed switch. Indicate whether the light is on or off.**
- When an electric current reaches an open switch, the current _____.
  - This creates an _____ circuit.
- When an electric current reaches a closed switch, the current _____.
  - This creates a _____ circuit.
- **Why would you want a switch in a circuit?**



stops

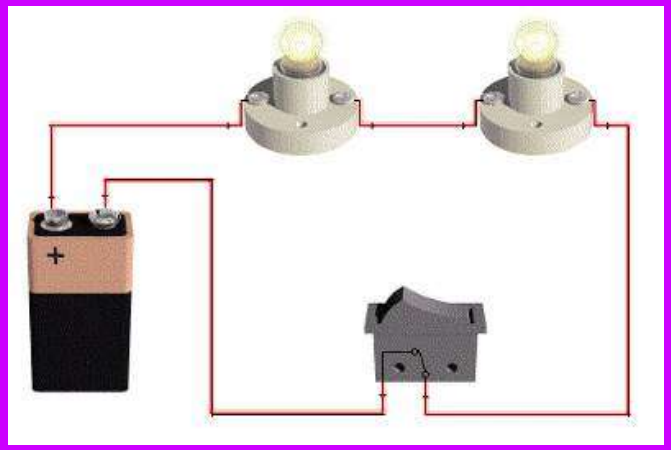
open

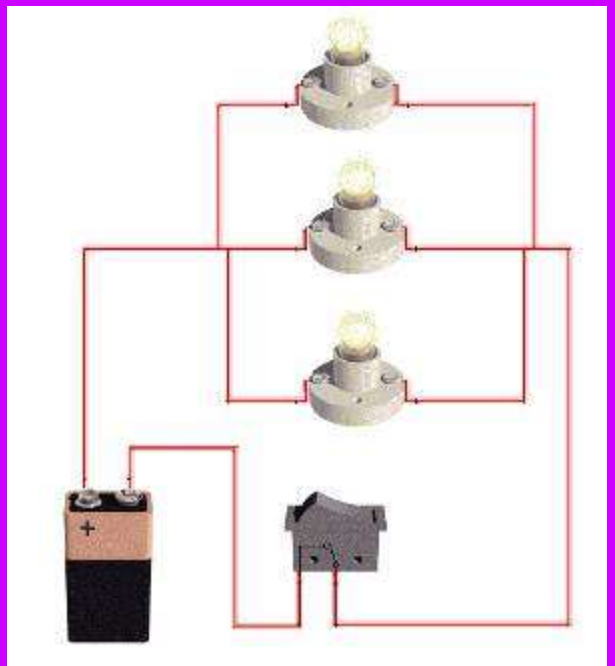
continues

closed

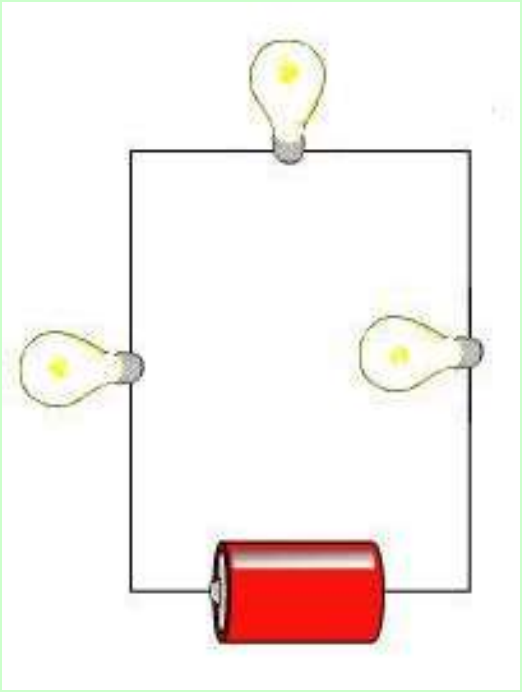
Types of Circuits

- Two types of circuits:
  - Series Circuit
    - Provides only one possible path for the flow of current.
  - Parallel Circuit
    - Offers more than one path for the flow of electricity.



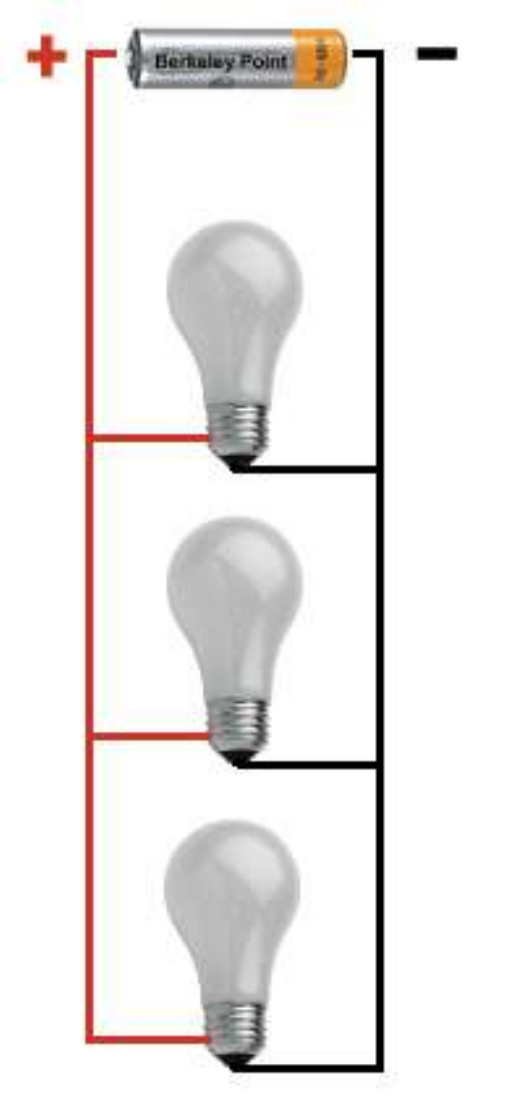


Series Circuits



- In a series circuit, the loads are set up in a series, or line, that requires the current to flow through one load before passing through the next.
- Draw your circuit on your notes sheet.
- Use arrows to indicate the direction the electric current is traveling.

Parallel Circuits



- In a parallel circuit, each load has its own path for electricity.
- Draw your circuit on your notes sheet.
- Use arrows to indicate the directions the electric current is traveling.