# SNC1D7
# Current Electricity

# Static electricity review…

- Static electricity is electrons gathered in one place (surface of object) and randomly move in all direction
- What do we use electricity for?


# hmm

- Electrons in the i-pod are used to make music.
- Electrons in a light bulb are used to make light.
- But...
- Why would it be challenging to use static electricity in electrical devices, such as your i-pod, TV, computers, etc?

- We can control electron movement to power i-phones, light bulbs, and other household appliances.
- **<u>But what does electrons flow through?</u>**
- **<u>And, what causes them to move?</u>**
- These are our focus questions as we work through the rest of the unit.

# Homework...

- You were asked to learn about conductors and insulators for homework.
- Why do you think she asked you do that?

- **Conductors:** are materials that allow the movement of electrons. Examples: iron, copper, silver.

- **Insulators:** are materials that prevent the movement of electrons. Examples: plastic, wood.

Practical Implications?

# Circuits

- Electrons flow through conductors in a controlled path known as circuits.
- Circuit in Latin is, circuitus, which simply means, “going around.”
- Electron flow is known as current e

# Components of a circuit

- Activity:
  - 6 stations around our lab benches.
  - Your task will be to get into groups of 4, and attempt to light up the bulb using only the materials given.
  - Were you successful? Explain your reasoning.
  - What else might you need? Brainstorm.
  - Move to the next station (clockwise).
  - **Group 6:** Study figure 10.1 in pg 324 of your textbook
  - **<u>To be handed in after individually.</u>**

- **Group 1:** light bulb; 2 cell battery; 1 switch, 1 wire
- **Group 2:** light bulb; 2 cell battery; 2 wires
- **Group 3:** light bulb; 4 connecting wires; switch
- **Group 4:** light bulb; 2 cell battery; 2 connecting wire; switch
- **Group 5:** light bulb; 2 cell battery; 3 connecting wires, switch
- **Group 6:** Study figure 10.1 in pg 324 of your textbook

# Drawing Circuits

- What is required?
- What are their symbols, names and functions?
- Handout given. Follow overhead.

# Practice

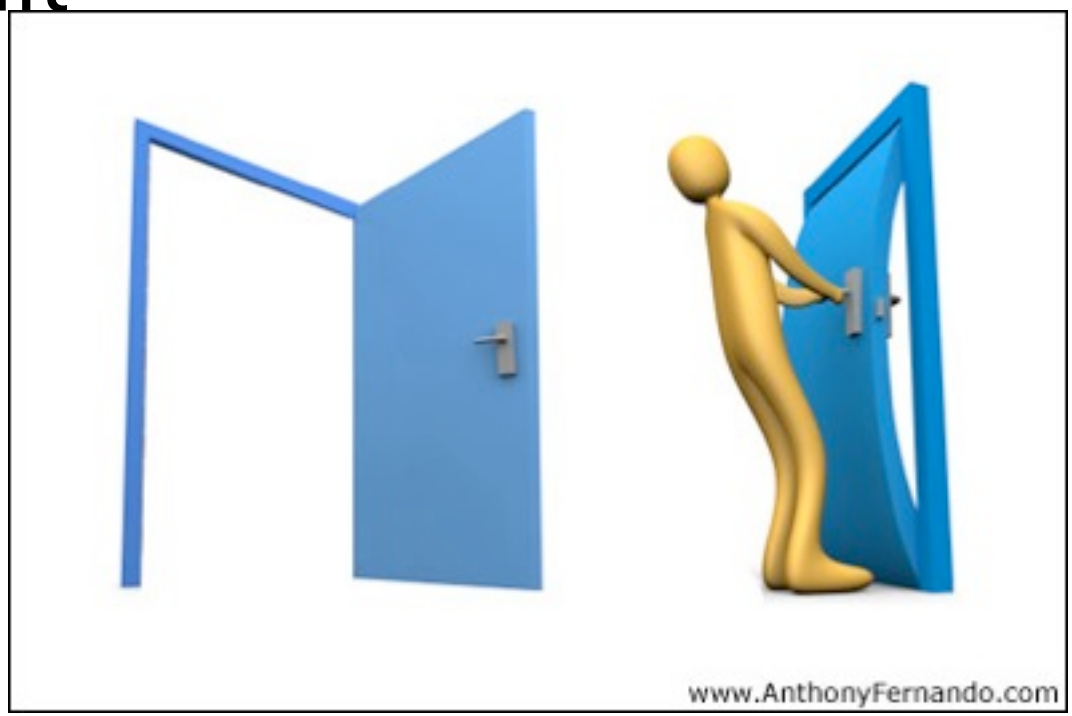
- Most groups were successful at station 5.
- Let us try to provide a schematic representation of the circuit at station 5.
- **1st step** is to determine the circuit diagram symbols for each part (aka device, components)
- **2nd step: Begin with** the battery (cell), the source of electron flow
- **3rd step** is to draw the switch
- **4th step** is to draw the load (lamp)
- **5th step**: connect the devices with a wire.

**True or False**: secret vote of science

- Electrons flow freely in an open circuit; whereas in a closed circuit they do not, and hence no electricity.

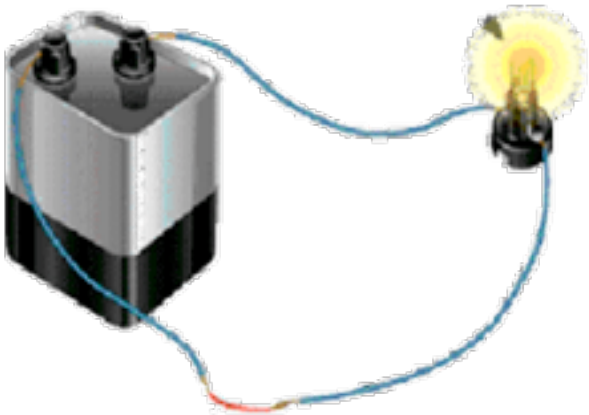
# Open and Closed circuits

- Misconception: electrons flow through a open circuit, instead of a closed circuit



# Open and closed circuits cont'd...

- In an open circuit, the circuit is not complete, instead it is broken
- In a closed circuit, the path is uninterrupted.



Switch
(closed)

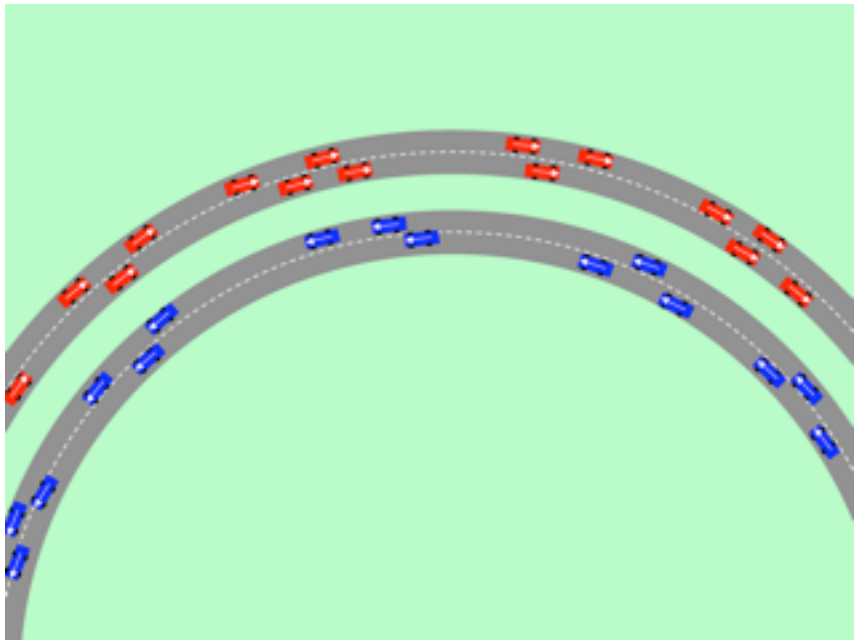
Switch
(open)

# Homework


- Why do power sockets have  2 pins?

- Come up with an analogy that cures the misconception of open and closed circuits. **To be presented to the class**.

# 2 Types of circuits:
# 1)Series 2)Parallel circuits



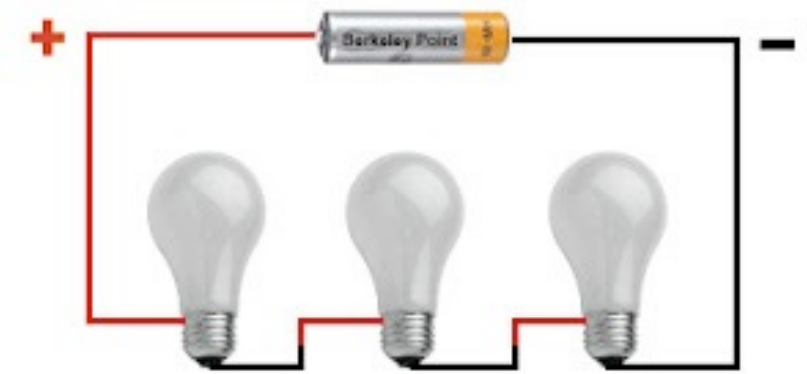
# Magic ball activity

1. Make a circle around me. Be in contact with the person next to you.
   - What happened to the magic ball when one hand was open (open circuit).

2. Make a figure of 8 around me. What did we see in the magic ball?
   - What happened to the magic ball when one hand was open (open circuit).

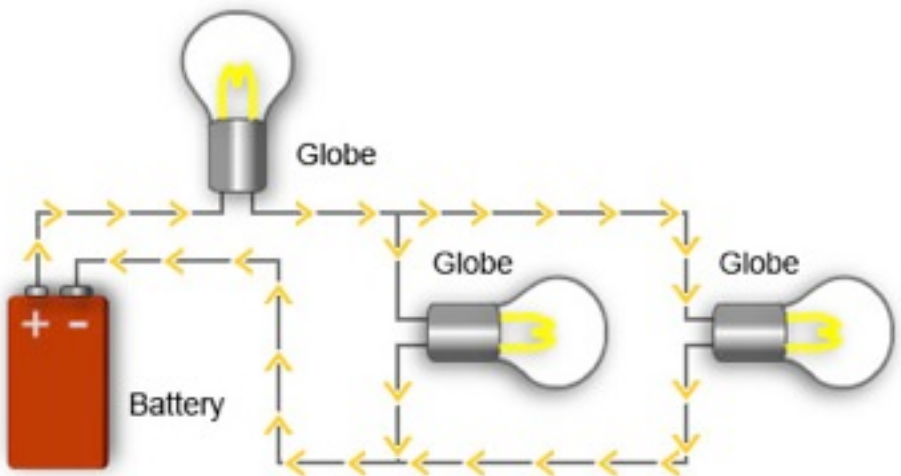
# Series circuits

- Flow of electrons follow only one path. This is achieved by connecting the loads in a chain, one after another in a continuous loop.



# Parallel Circuits

- Electrons can flow more than one way. Loads are connected by branches so that there are two or more paths.



# Drawing series circuits

- Draw a series circuit consisting of a lamp, open switch, and 2 cell battery connected by an ideal conductor.

1. Draw the symbols of each component given.
2. Always begin with the battery ($e^-$ source).
3. Then we include the switch (which turns the lamp, on or off)
4. Then include the lamp.

# Practice drawing the following circuits

- Two lamps in series
- Two cells in series
- A closed circuit exists with 2 cells connected in series, then the switch, then two light bulbs connected in series. Show the flow of electrons with an arrow.

# Drawing parallel circuits

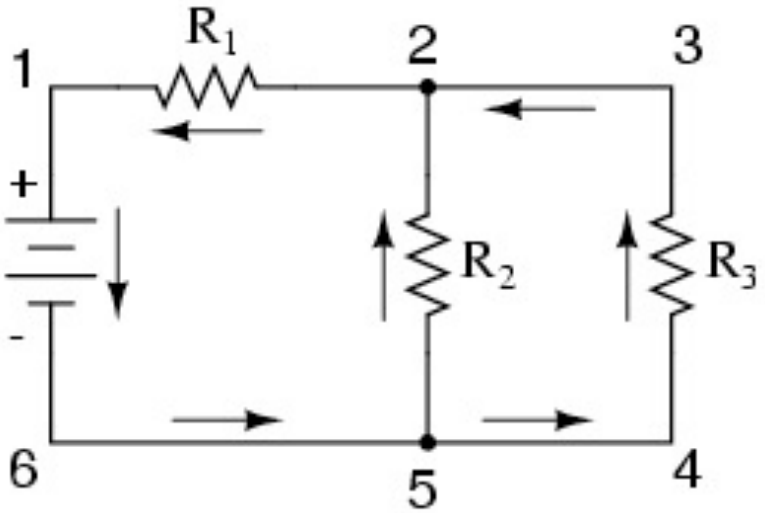
- Draw a closed circuit with two lamps connected in parallel, with two switches, and a 3 cell battery in series, connected by an ideal conductor.

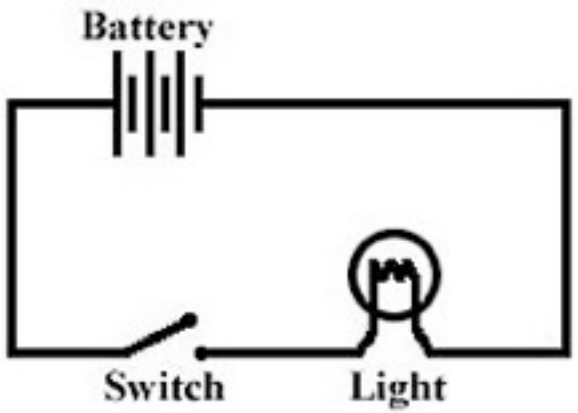
# Practice drawing parallel circuits

- Draw three cells in parallel.
- Draw two resistors in parallel
- The closed circuit consists of two cells in series, connected to a switch, that are connected to three resistors in parallel.

# Homework: describe the following circuits in words

*Series-parallel*



# Read pages 325, and 328, and make point form notes

***We are looking at a quiz next week, roughly Wednesday/ Thursday/ Friday.***

***Only on the things that I have covered….Current electricity***

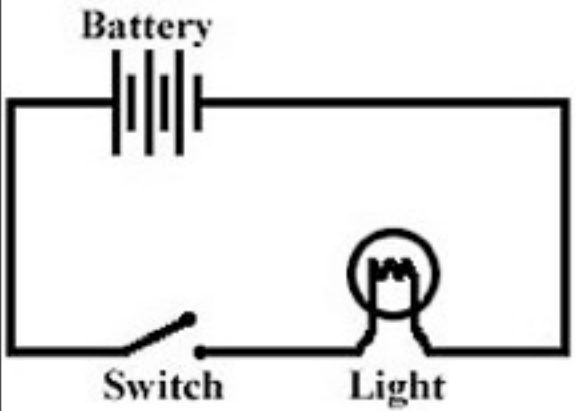
# More practice

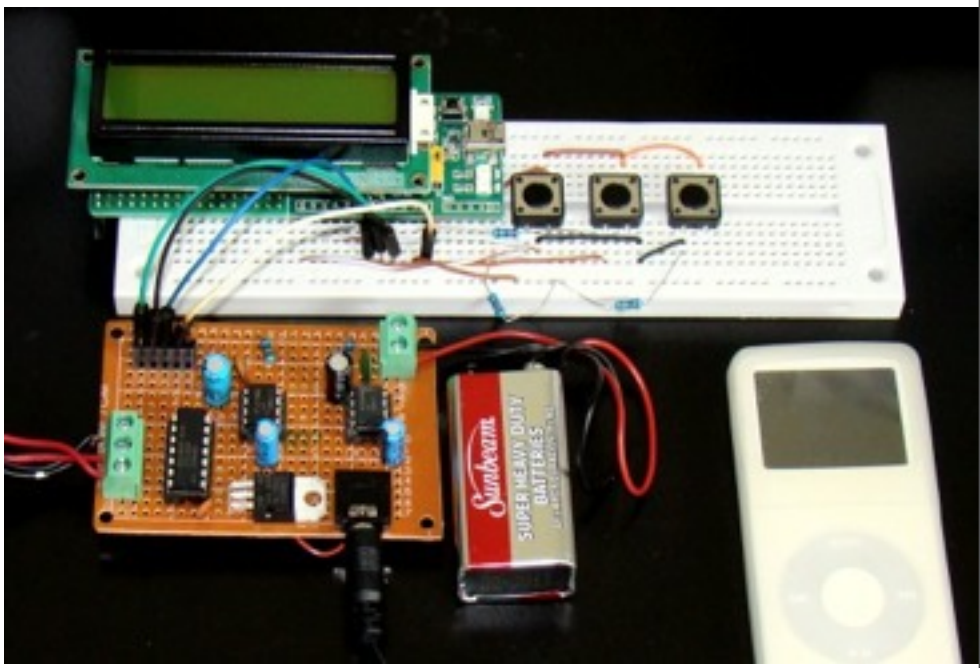
1. An open circuit exists with a light bulb connected to one dry cell, which is connected to a switch. Show the direction of electron flow with an arrow
2. 3 light bulbs are connected in parallel. An open circuit exists with a switch and four cells in series. Show direction of electron flow.
3. The circuit consists of two cells in parallel connected to a switch, which connects to three light bulbs in parallel. Place a switch where it will control current flow through one of the light bulbs.

# Building/drawing circuit activity

- Design your own circuit on paper, in groups of 4/5
- Be creative!
- Then build it
- Focus Question:
  - How does the brightness of the light bulbs compare between series and parallel connections?

**Your design is to be handed in at the end of class.**


Battery
Switch
Light


Sunbeam
SUPER HEAVY DUTY
BATTERIES

# More characteristics of series and parallel circuits

**Series Circuits**

- Electrical energy is shared between loads.
- Brightness of the light bulbs?
- Mainly found in simple devices (eg. Flashlights, toy cars)

**Parallel Circuits**

- Electrical energy is NOT Shared between loads.
- Brightness of the light bulbs?
- Mainly found in more complex places (eg. House, school)

# Riddles

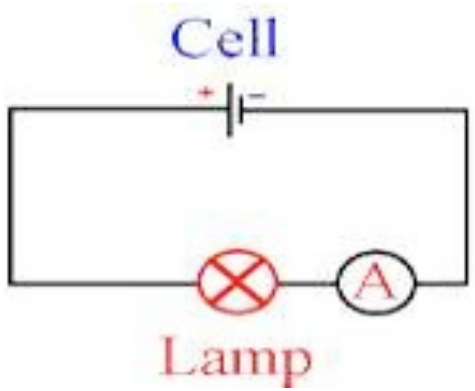
- **Blood** Water

# Measuring Current

- Current, we defined, as the flow of electrons.
- But how would you measure this?
- And, why should we care to measure it?

# Measure current

- Measuring the rate of electron flow past a given point in a circuit.
- Current is measured in amperes (I) by a device called, ammeter.
- Ammeter must be connected in series with a load when measuring current.



# Measuring Current Analogy

- Imagine a waterfall, and you wanted to measure the rate at which water was flowing.
- You would stand near the cliff and count the number of water molecules flowing past tha

# Measuring the rate of electron flow

- Rate implies a time frame.
- Thus, Current = amount of charge (–) per unit of time
- Charge = Q
- Current = I
- Time = t

- Therefore: I = Q/t