January 5th 2016 **page 119**

DO:

I will be able to explain what forms electricity as well as how electricity is harnessed and used in circuits.

EQ's:

1. **How would you construct a series and parallel circuit?**
2. **2. Why are parallel circuits more effective than series circuits?**

Think about it...

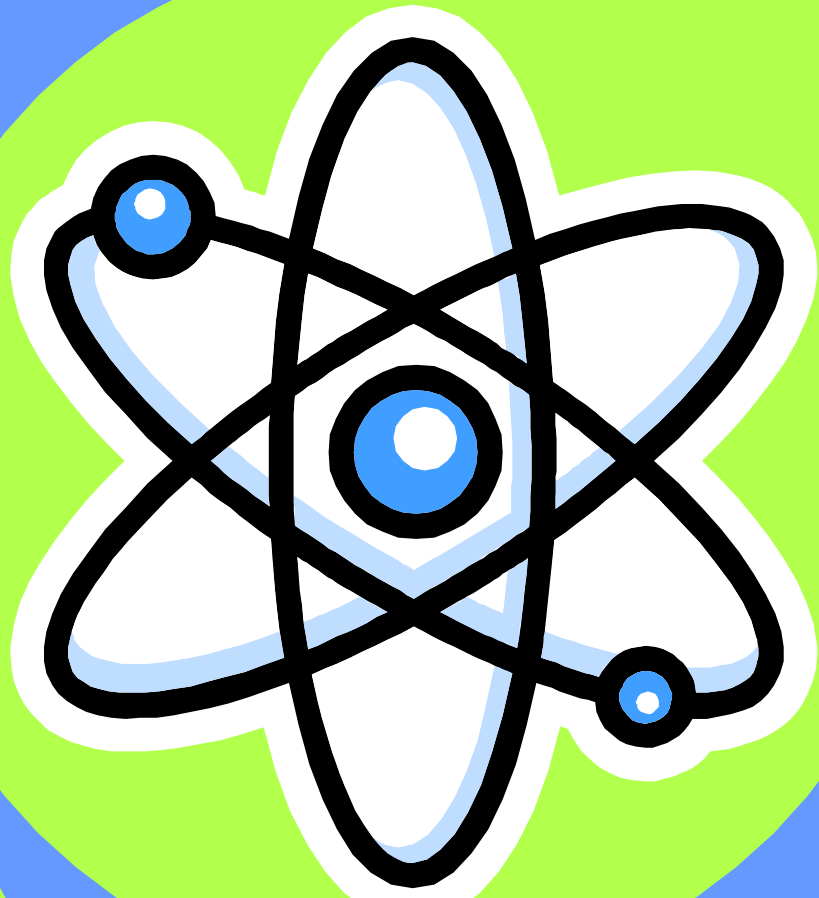
- What makes up electricity?
- As electrons move what are they transferring?
- How do the LOCM and LOCE relate to this particular clip?
- Explain how the electricity is making noise.

Think about it...

- **What makes up electricity?**
- **How do the LOCM and LOCE relate to this particular clip?**
- **Explain the science of the connection between how atoms, matter, energy, waves, and electricity.**

Electric Charges

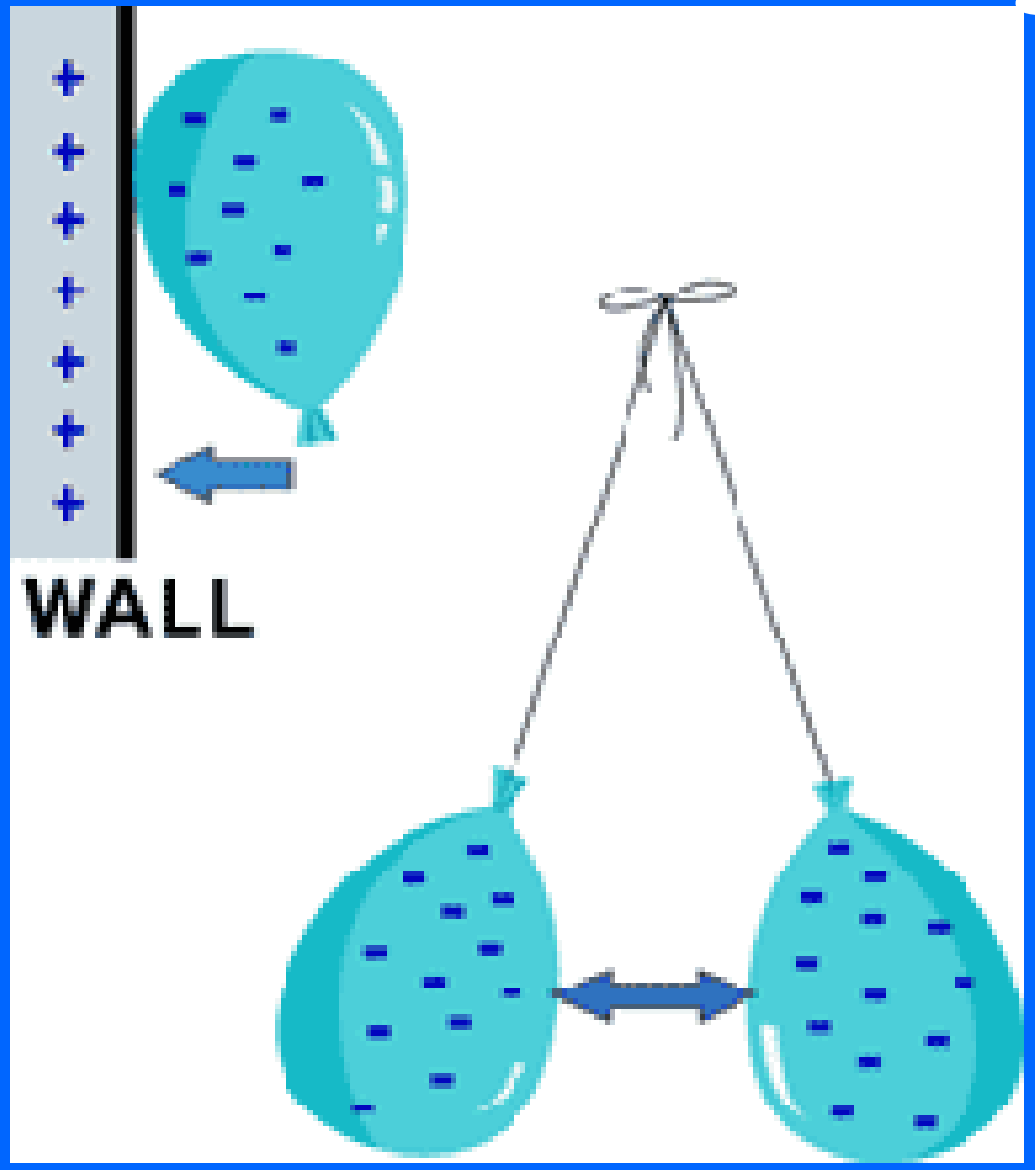
- Three particles that make up an atom:
  - Protons — POSITIVE
  - Neutrons — NEUTRAL
  - Electrons — NEGATIVE



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.

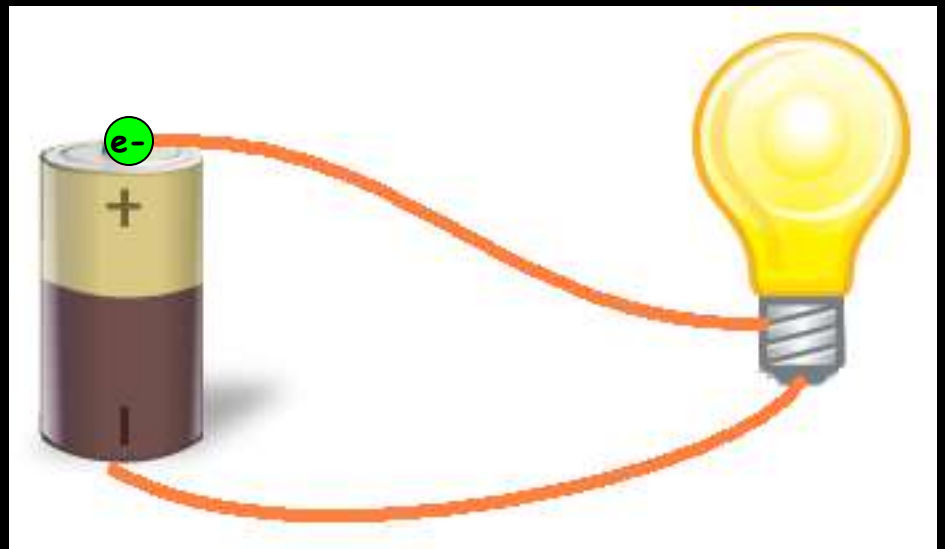
How Charges Interact



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

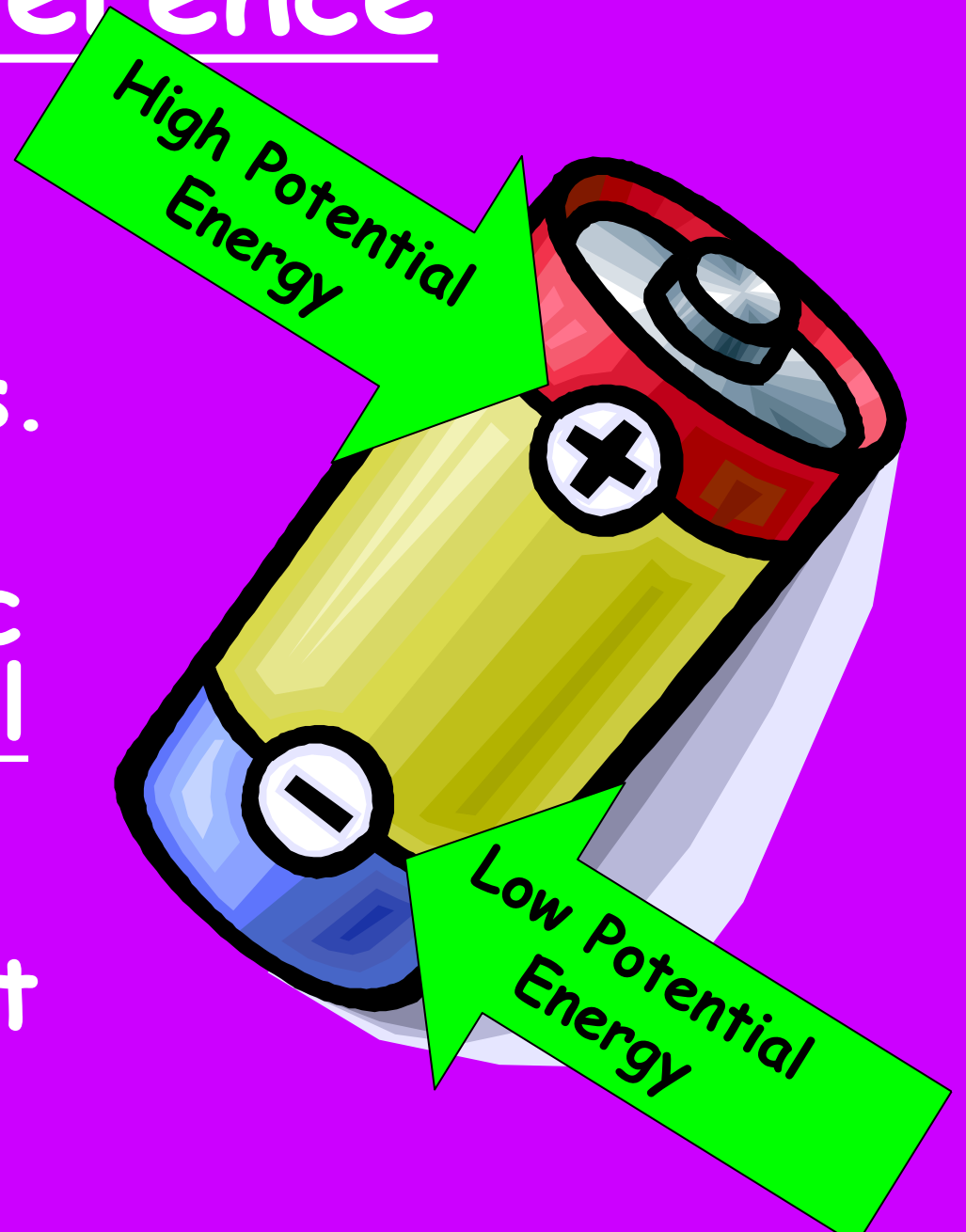
Electric Current

- 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

- 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.



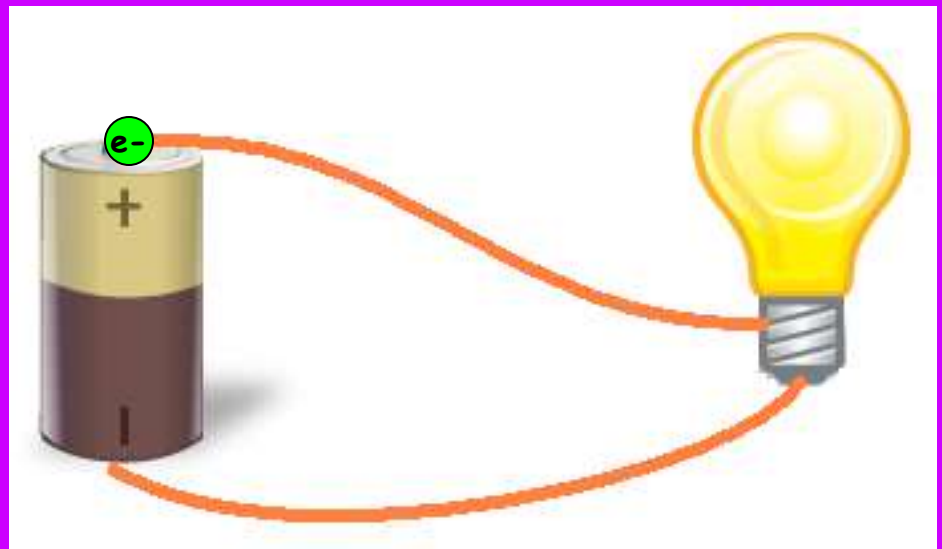
Potential Difference

- 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.

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

Quantity	Symbol	Unit of Measurement	Unit Abbreviation
Current	I	Ampere ("Amp")	A
Voltage	E *or* V	Volt	V
Resistance	R	Ohm	Ω

V, voltage

Measured in volts V
Is energy per unit of charge
1V = 1 joule/coulomb

I, current

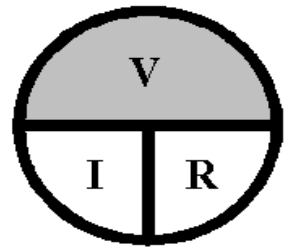
Measured in amps A
Is rate of flow of charge
1A = 1 coulomb/second

R, resistance

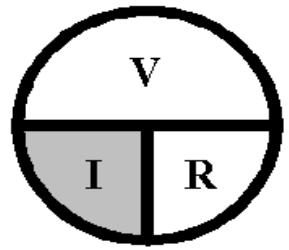
Measured in ohms Ω

V = Voltage (formerly know as Electromotive Force)(in Volts)
I = Current (in Amperes)
R=Resistance (in Ohms)

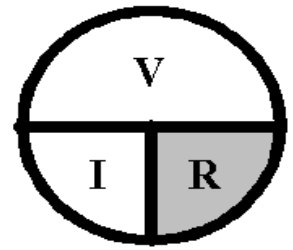
This diagram illustrates that if you know any 2 of the 3 variables, you can find the 3rd. Cover up the variable you don't know, and the position of the other two will indicate the calculation you need to use to find the missing number.



V=I x R



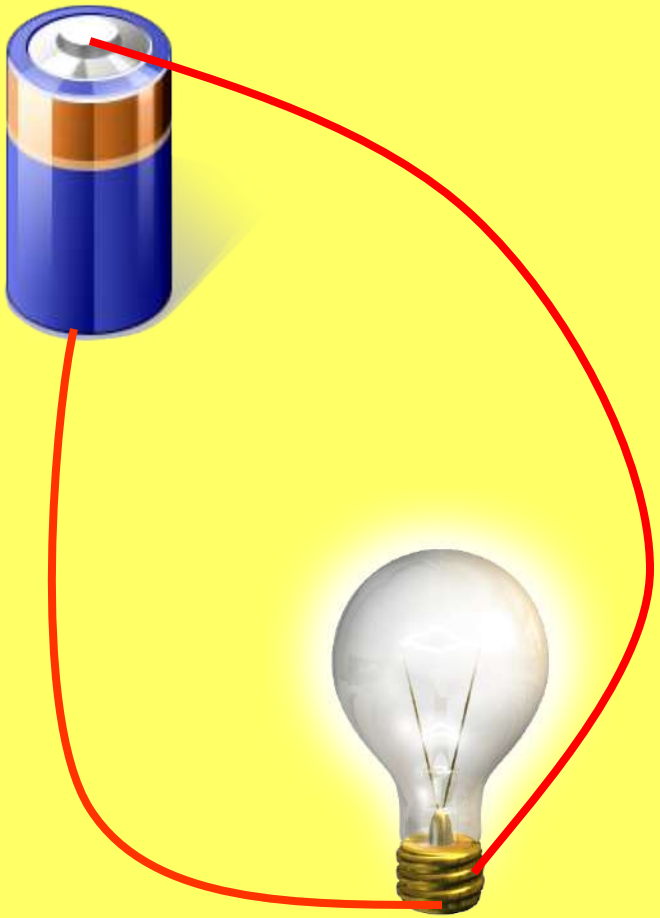
I=V/R



R=V/I

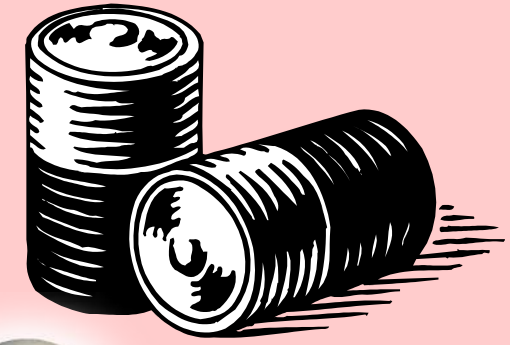
Basic Circuits

- A circuit is a path through which electricity can flow.
- Most circuits have three parts:
  - An energy source
  - One or more loads (run by electricity)
  - Conductors (wires) that connect the two

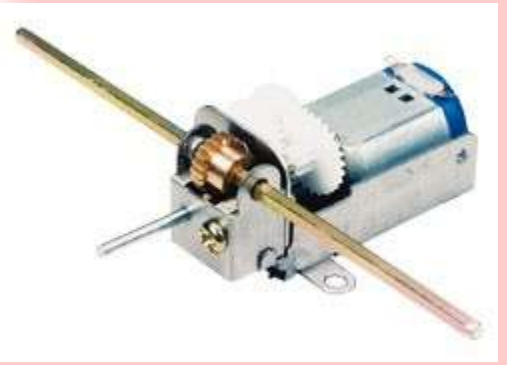


Parts of a Circuit

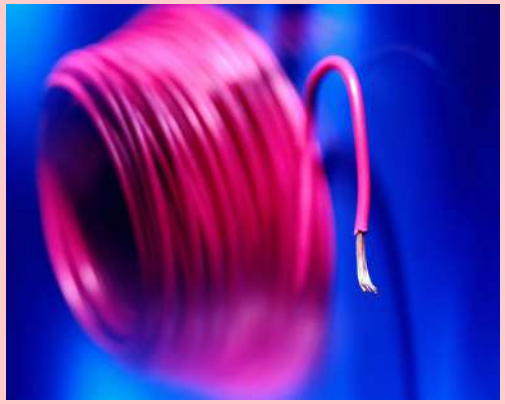
- Energy Source – A circuit needs an energy source to push a charge through the circuit.
  - Examples?



- 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?



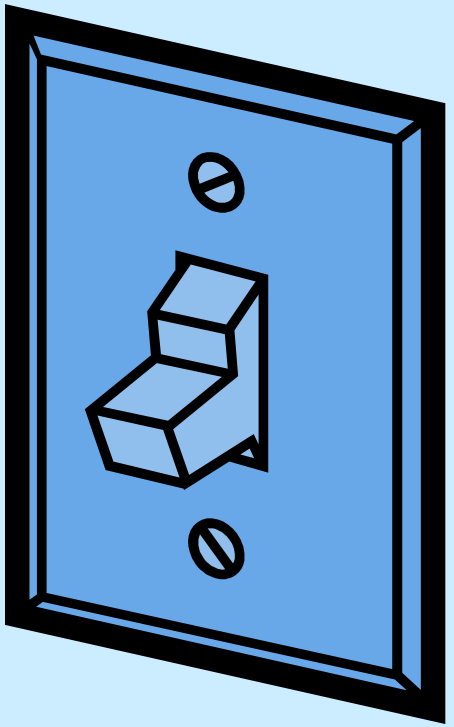
Parts of a Circuit Continued

- 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 ___stops___.
  - This creates an ___open___ circuit.
- When an electric current reaches a closed switch, the current ___continues___.
  - This creates a ___closed___ circuit.
- **Why would you want a switch in a circuit?**



Closure

- Draw your own circuit.

January 6th 2016 page 121

DO:

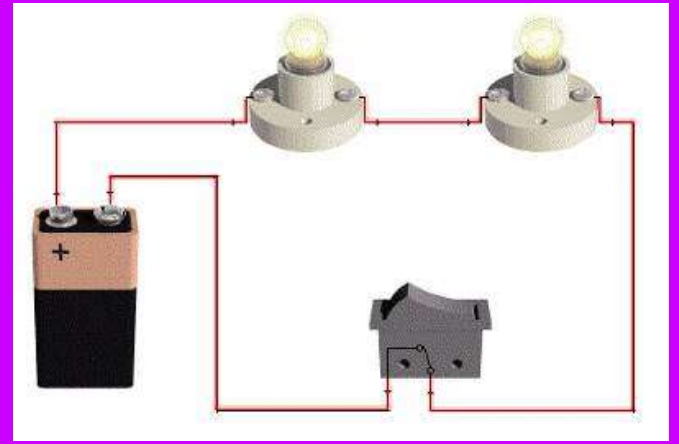
I will be able to explain how circuits are constructed as well as label the parts of a circuit.

EQ's:

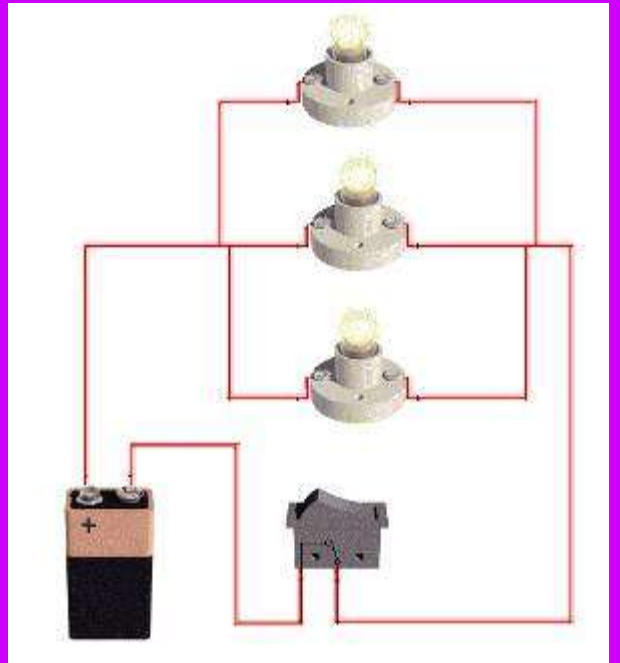
1. **How would you construct a series and parallel circuit?**
2. **2. Why are parallel circuits more effective than series circuits?**

Types of Circuits

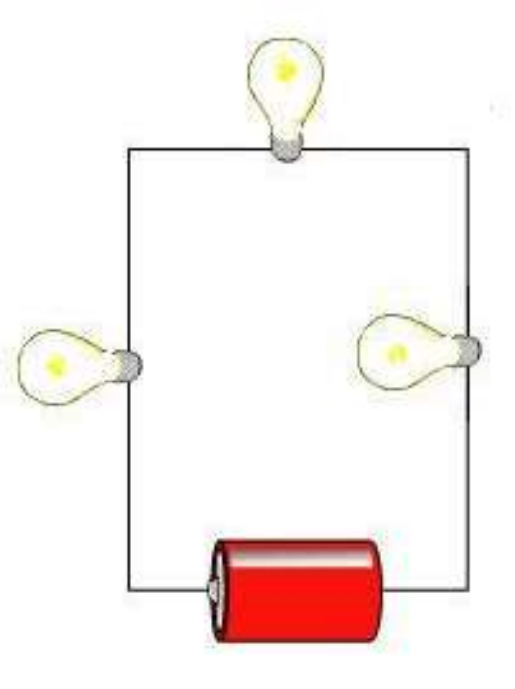
- Two types of circuits:
  - Series Circuit
    - Provides only one possible path for the flow of current.



  - Parallel Circuit
    - Offers more than one path for the flow of electricity.



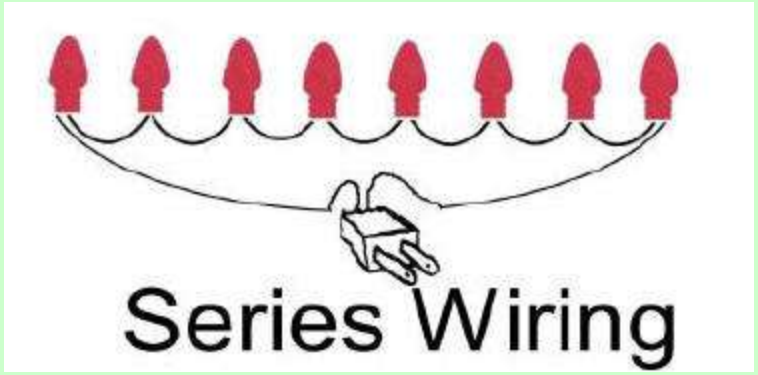
Series Circuits



- 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.
- Create a series circuit using the materials at your table. (the switch is optional)
- Draw your circuit on your notes sheet.
- Use arrows to indicate the direction the electric current is traveling.

Series Circuits Continued

- If you were to disconnect one of the bulbs in your circuit.
  - What happens to the other bulbs?
    - Because there's only one path for the current to follow, a failure or break in any part of the switch will stop the flow of electricity through the entire circuit.
  - Where have you seen this happen before?



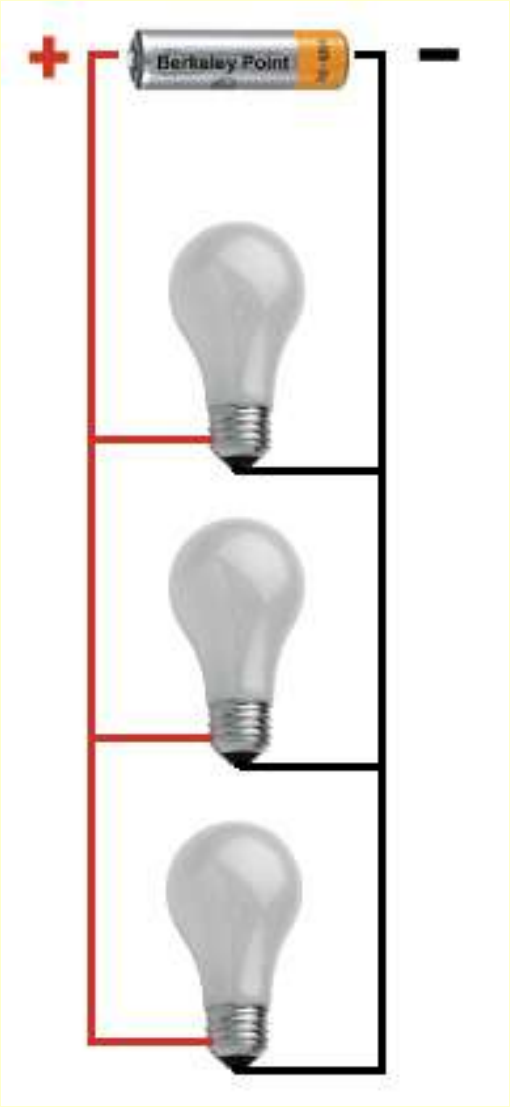
Series Circuits Continued

Because all of the loads share the same energy source. This means that the current lowers as more loads are added to the circuit.

What if the loads were motors? Would they be able to do as much work if they're wired in a series?

On your notes, list the <u>disadvantages</u> of using a <u>series circuit</u>.

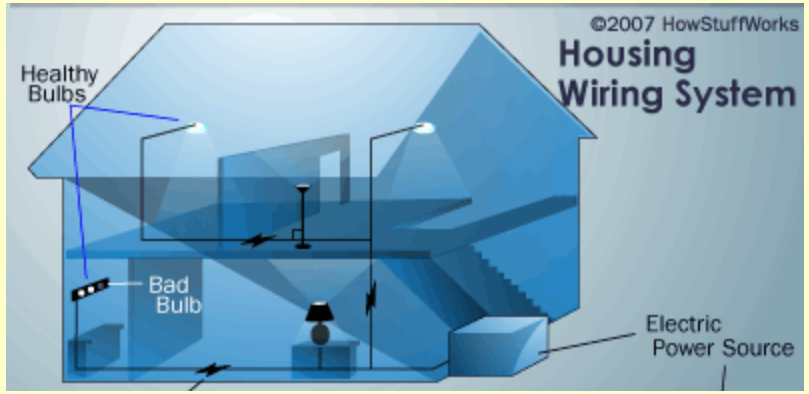
Parallel Circuits

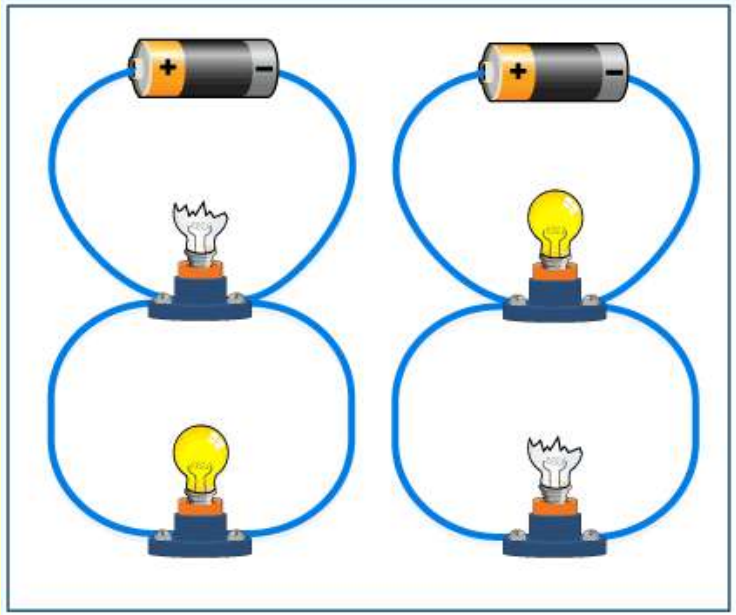


- In a parallel circuit, each load has its own path for electricity.
- Create a parallel circuit using the materials at your table. (the switch is optional)
- Draw your circuit on your notes sheet.
- Use arrows to indicate the directions the electric current is traveling.

Parallel Circuits Cont.

- If you were to disconnect one of the bulbs in your circuit.
- What would happen to the other bulbs?
  - Because a parallel circuit provides more than one path for electricity, a failure in one part of the circuit will not affect another part of the circuit.
- Where have you seen this happen before?





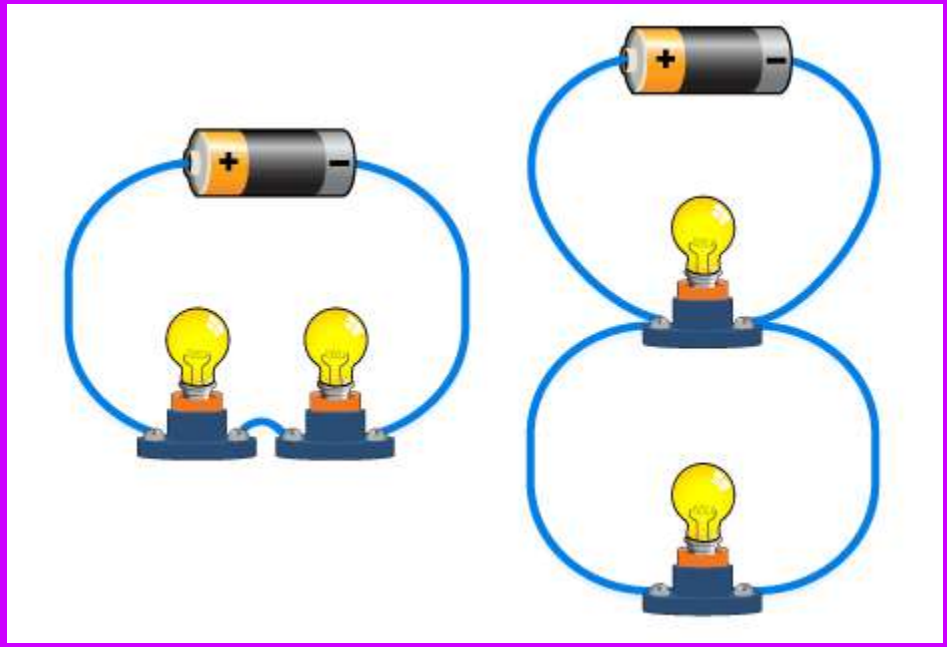
Parallel Circuits Cont.

- When you reconnect your parallel circuit the bulbs are still bright.
- Even if all bulbs are connected or some are out the brightness is the same.
  - The loads in a parallel circuit do not share current in the way that loads connected in a series will share.
  - Each load connected to a parallel circuit uses the full voltage of the energy source.
  - What if the loads were motors?
  - Would they be able to do as much work if they're wired in a series?

Series VS. Parallel

- What's the big deal?
  - What happened when you added more loads to a series circuit vs a parallel?
  - Why don't we use Parallel circuits all the time?

- Which would cause the energy source (battery) to be drained more quickly?
- Which uses more electric energy?



January 8th 2016 page123

DO:

I will be able to explain what forms electricity, as well as construct & diagram circuits that harness electricity, and compare and contrast the advantages and disadvantages of each type.

EQ's:

1. Diagram a parallel and series circuit. Include a load, source, and path for each)
2. Compare and Contrast series and parallel circuits.
3. Explain the technical issues that could arise and cause an incomplete path.
4. Explain how circuits can be used to express the law of conservation of energy.

ELECTRICAL CIRCUITS

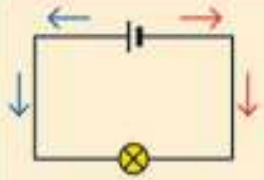
Electric current is the flow of charge around a circuit.

CIRCUIT

Electric current can only flow if there is a complete circuit. Any gaps will stop the current flowing.

- In a circuit, a battery provides the energy (voltage) to push charge around the circuit. A battery is made up of numerous connected cells.
- Ammeters are used to measure electric current.
- Current cannot be used up.

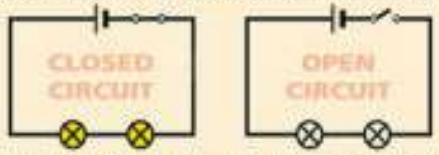
CONVENTIONAL CURRENT



Conventional current is shown on circuits as flowing from positive to negative. However, the moving electrons actually have a negative charge and flow in the opposite direction to conventional current.

SERIES CIRCUIT

The electrics in computers, stereos and televisions contain series circuits.



- The current is the same anywhere in this circuit, as the current can only take one path.
- The current can be turned on (switch closed) or off (switch open).
- The more cells in the circuit, the brighter the bulbs will be.
- The more bulbs there are in the circuit, the more resistance against the current. Therefore, the bulbs will be dimmer.

PARALLEL CIRCUIT

The mains electricity in a house is a parallel circuit, allowing appliances to be used independently.

- The current takes more than one path.
- The current joins back up again on its way back to the battery. Therefore, the current is the same at the start and at the end of the circuit.
- Switches can be turned on or off to allow or restrict the flow to one or more parts of the circuit.
- Remember: Current is not used up.

Symbols used to represent circuit parts:

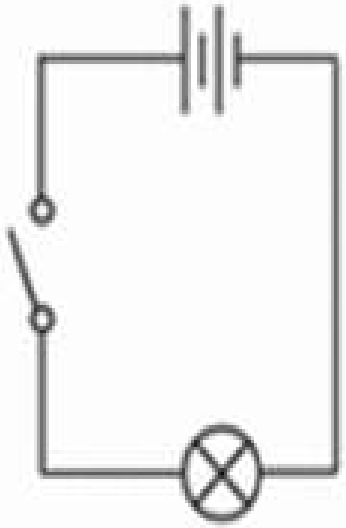
BATTERY: 

WIRE:

LIGHTBULB: 

SWITCH: 

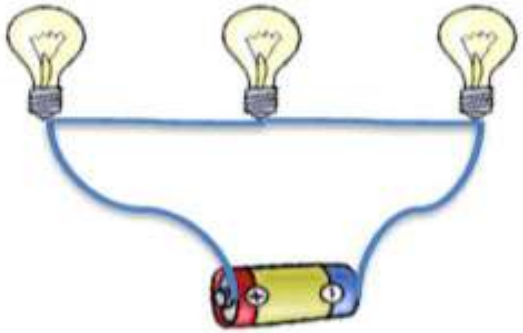
Circuit Diagram:

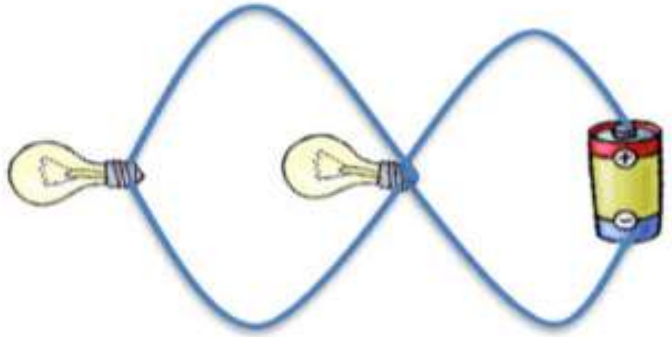


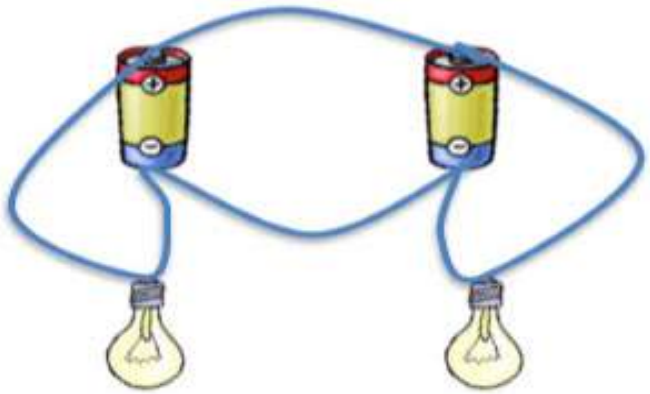
Drawing of Circuit:

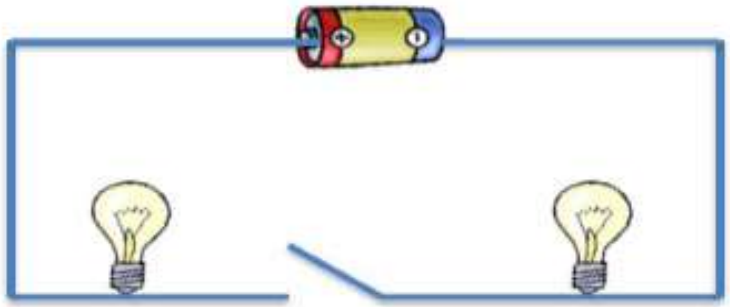
Is it a Series Circuit or Parallel Circuit?

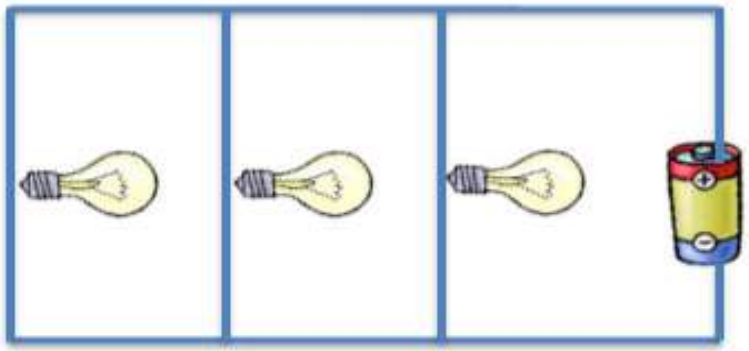
Identify each one as a series or parallel circuit. Justify your answer.

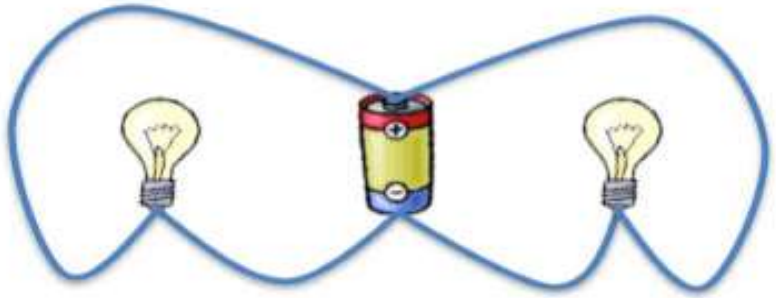








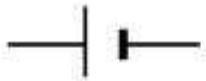




ASNSWER THE EQ's:

1. Diagram a parallel and series circuit. Include a load, source, and path for each)
2. Compare and Contrast series and parallel circuits.
3. Explain the technical issues that could arise and cause an incomplete path.
4. Explain how circuits can be used to express the law of conservation of energy.

Circuit Symbols

SYMBOL	Can you copy the symbol?
 Battery	
 Lamp	
Wire	
 Switch (open)	
 Switch (closed)	

Circuits

Fill in the missing words

loop | complete | energy | path | negative | positive | electricity

A circuit is a _ _ _ _ that allows _ _ _ _ _ _ _ _ _ _ _ to pass through it.

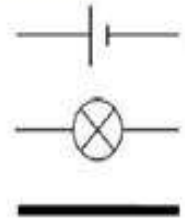
Electricity always travels from the _ _ _ _ _ _ _ _

to the _ _ _ _ _ _ _ _.

A circuit will only work if it is _ _ _ _ _ _ _ _. This means it must make a complete _ _ _ _, otherwise the electrical _ _ _ _ _ _ cannot flow.

Draw arrows on the diagram to show which way round the electricity is flowing.

Can you label these symbols?

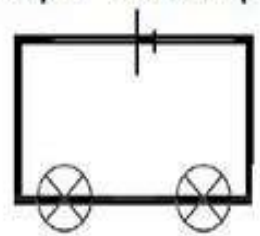


_____

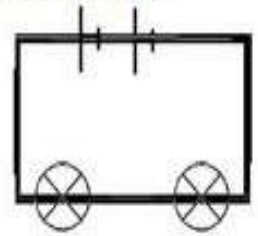
_____

_____

Look at the following circuits. Can you work out how many of each component is in each circuit?



There are



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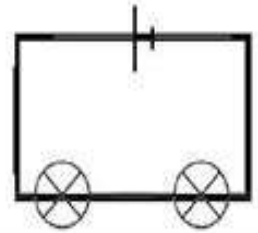

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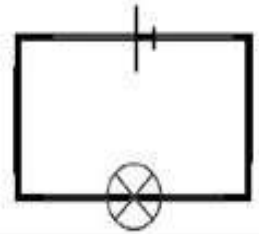
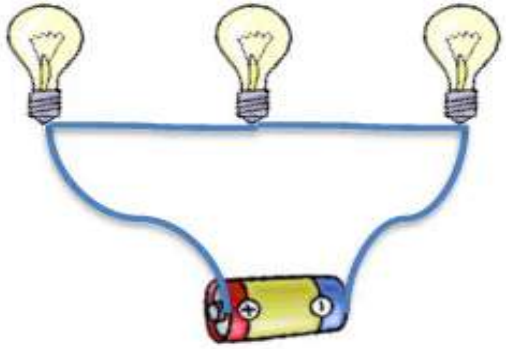
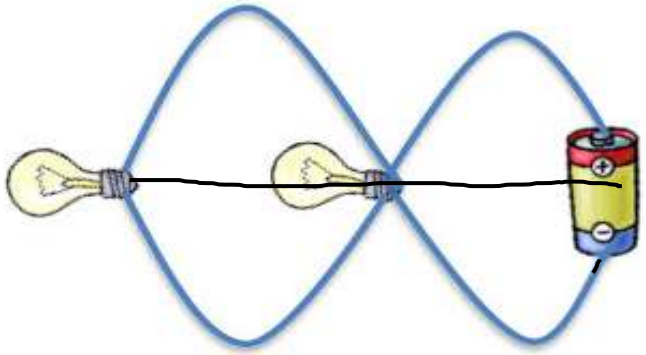


There are

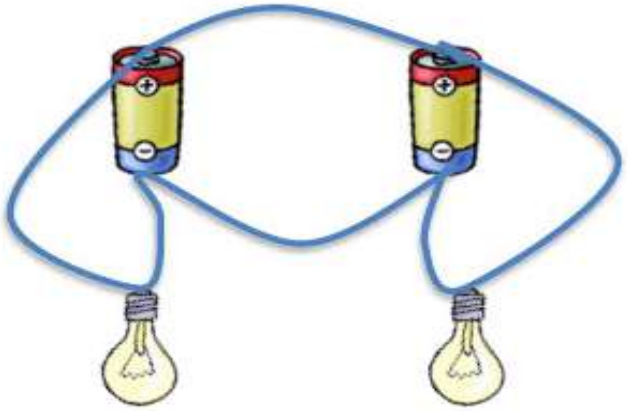
Is it a Series Circuit or Parallel Circuit?



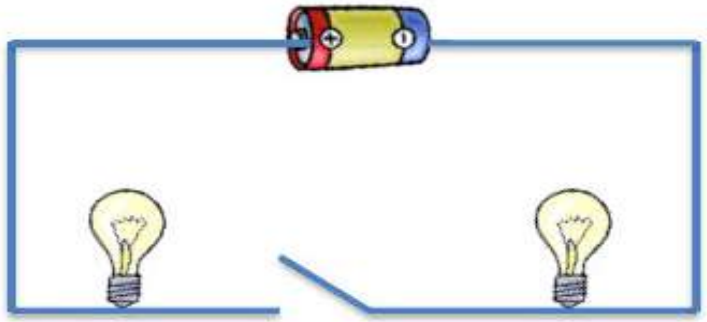
Justification: Series circuit: There is only one path for the electrical current to pass through. If there is a break in the circuit, all three lights will go out.



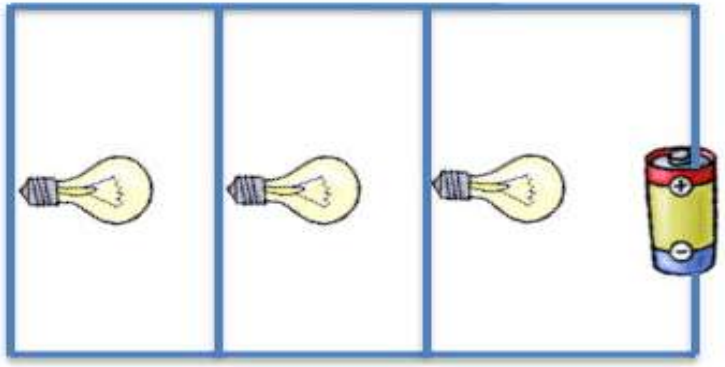
Justification: Parallel circuit: There are two paths for the current to pass through. If one circuit is broken, the other light will still illuminate.



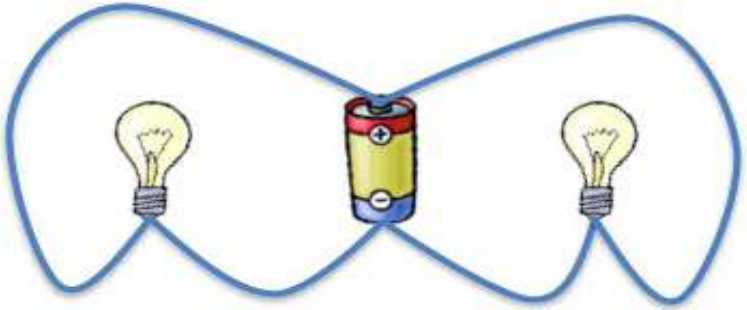
Justification: Parallel circuit: There are two paths for the current to pass through. If one circuit is broken, the other light will still illuminate.



Justification: Open series circuit: There is a break in the circuit, so neither light will illuminate.



Justification: Parallel circuit: There are three paths for the current to pass through. If one circuit is broken, the other lights will still illuminate.



Justification: Two series circuits: There is only one path for the current to pass through to each light. If there is a break in the circuit to one of the lights, the affected light will go out.

Draw the symbols for the following parts of a circuit:

Wire = _____

Battery = _____

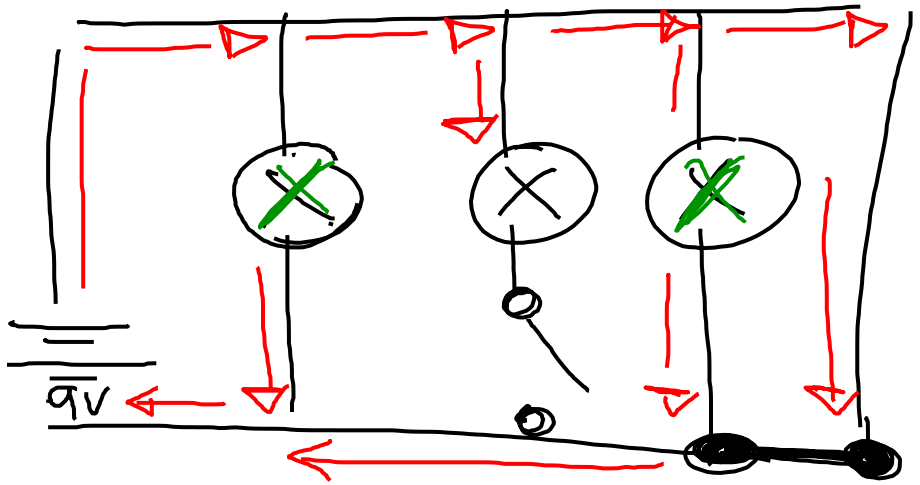
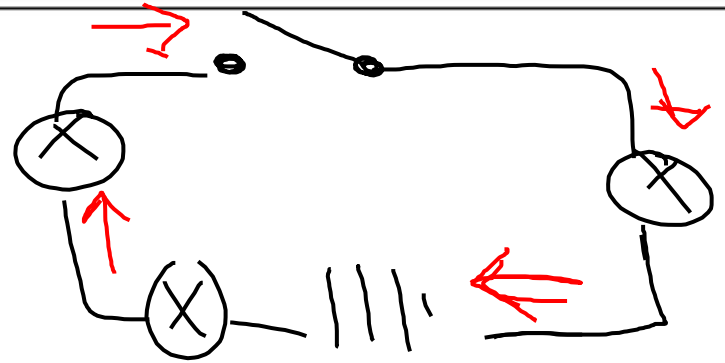
Light bulb = _____

Open Switch = _____

Closed Switch = _____

Resistor = _____

Draw a circuit diagram for the following scenarios:

Scenario 1: 1. Parallel Circuit (3 paths) 2. One (9V) battery 3. 1 light bulb on each path 4. One resistor (anywhere you like) 5. One open switch 6. One closed switch	
Scenario 2: 1. Series Circuit 2. One AC power source 3. 3 light bulbs 4. One open switch	

Scenario 3: 1. Parallel Circuit (2 paths) 2. One motor 3. 1 light bulb on the first path 4. 2 light bulbs on the second path 5. One open switch 6. One closed switch	
Scenario 4: 1. Series Circuit 2. One (9V) Battery 3. 2 Light bulbs 4. One resistor 5. One closed switch	

Work Time

- MIDTERM CORRECTIONS

OR

- Finish working on the section 4 and 5 Reviews in Chapter 20 of the textbook. (page 706-717)

OR

Tesla/Edison Investigation

Closure

3- Things that I could teach

2- Questions for a test

1- A song, show, movie that connects is...

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