**Intro to Electricity**

***Review of the Atom***

- Subatomic Particles

 - Protons - Electrons - Neutrons

- Electrically ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

- # protons = # ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

***Basics of Charge***

- Cannot see or ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** charge

- Observe its ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** on other particles

- Opposite charges ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

- Like charges ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

***Charge Interaction***

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***Opposite Charge Attraction***

*- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* charges = greater attraction

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***Electric Field***

- An ***electric field*** extends ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** through space from every ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

- As the ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** of the electric field from the charged particle *increases*, the ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***of the electric field ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

- Electric Field is ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** where lines are ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** to each other (closest to the charged particle)

***Electricity and the Atom***

- In the atom, ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** are free to ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***(protons can’t because held in the ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***)

*-* ***Lose*** electrons = object has ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** charge

*-* ***Gain*** electrons = object has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ charge

- Atom that loses or gains an electron = ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

***Law of Conservation of Charge***

- Charge cannot be created or destroyed.

- It can only be ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** from one object to another.

***Conductors vs. Insulators***

*-* ***Conductor*** – ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** are able to move \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

*-* ***Insulator*** – electrons not able to move easily – ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

- Why is this important when it comes to electricity?

***Static Electricity***

- The ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** of electrons from one object to another without further ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** is called ***static electricity***.

- Static means *not moving* or ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***.

- **Static electricity** is the build-up of electric charges on an object.

- Once built up, the charges remain at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; they do not ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***!

**Methods of Charging**

***1) Conduction***

*- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*-* ***Conductors*** are made of materials that easily conduct electricity

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***2) Induction***

*- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* necessary

*- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* of electric charges

***3) Friction***

- Rubbing 2 objects together

- One ***loses*** electrons, one ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** electrons

- Both become ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

***Detecting Electric Charge***

*-* ***Electroscope*** – detects electric charge

- Leaves

 - flaps of ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

 - hang ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** – no charge

 - leaves ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** – electric charge present

***Electric Discharge***

- Charged objects usually ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** their charge to ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** molecules in the air

- Static electricity is more noticeable on dry days. Why?

*-* ***Electric discharge*** is the ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** of static electricity

***Electric Discharge - Lightning***

- Static electricity accumulates in clouds from water droplets rubbing against one another

- When the opposite charges between clouds (or clouds and ground) become too great, a tremendous electrical discharge occurs!

***Flowing Electricity***

*- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* must be done to move a charged particle

- The amount of work required to move a charge between two points (the work per unit charge) is called the ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

- Measured in ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(\_\_\_\_\_\_)***

***Electric Circuits***

- A ***Circuit*** is when a wire is connected to the terminals of the source to form a ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** path that electrons can follow

***Electric Current***

- A ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** of charge (***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***) is called an ***electric current***

 ***- letter variable*** = ***\_\_\_\_\_\_\_\_\_***

 - The amount of charge that ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** a given point ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

 - The ***unit*** for current is the ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** (\_\_\_\_\_) or \_\_\_\_\_\_\_\_\_\_ for short

***Resistance to Flow***

- Items in the circuit ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** the flow of electrons

 *- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*/appliance

 *-* ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

- The current is ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** by interactions with the load and atoms in the wire

***- Letter variable*** = ***\_\_\_\_\_\_\_\_\_\_***

- Unit = ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** (***\_\_\_\_\_\_\_***)

- Factors that affect resistance

 ***- Increases*** with ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ wire - Increases*** with ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ temperature***

 ***- Decreases*** with ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ wire***

***Ohm’s Law***

 Current (l) = amperes

 Voltage (V) = Volts

 Resistance (R) = Ohms

**1)** Calculate the voltage difference in a circuit with a resistance of 25 **Ω** if the current in the circuit is

0.5 A.

**2)** Find the current in a circuit that has a voltage of 120 volts and a resistance of 60 Ω.

**3)** Find the resistance of a circuit that has a voltage of 120 volts and a current of 4 amperes.

**Ohm’s Law Math Practice Name*:***
Physical Science

**COMPLETE ON A SEPARATE PIECE OF PAPER!!!!!!!!!!!!!!**

The speed or velocity of a wave can be found using the following equation:

$$I=\frac{V}{R}$$

I is the current, measured in amps (A)

*V* is the voltage, measured in volts (V)

R is the resistance, measured in ohms (Ω)

**Problems:** Work through the following problems. First write the appropriate equation with variables, and then fill in the numbers and solve. Make sure your answer has the correct units. The first one has been done as an example.

1. A copper wire is connected to a dry cell battery with a voltage difference of 1.5V. The current flowing through the wire is 1.2 A. What is the resistance of the wire?
2. A copper wire is connected to a 1.5 V dry cell battery. The current flowing through the wire is 1.4 A. What is the resistance of the wire?
3. A copper wire is connected to a dry cell battery with a voltage difference of 6V. The current flowing through the wire is 1.2 A. What is the resistance of the wire?
4. A copper wire is connected to a dry cell battery with a voltage difference of 6V. The current flowing through the wire is 12 A. What is the resistance of the wire?
5. A bulb with a resistance of 60 Ohms is in a circuit with a 12V battery. What is the current through this circuit?
	1. What is the current if you add one more bulb? (***hint:*** think about what the new resistance will be)
	2. What is the current if you add two more bulbs to the original circuit? (***hint:*** you now have a total of 3 bulbs)
6. A wire has a current of 6 A and a resistance of 2 Ohms, what is the voltage of the battery it is connected to in the circuit?
7. Calculate the voltage difference across a 25 Ohm resistor if a 0.3 A current is flowing through it.