***Electricity Notes, Part I DAL 05/30/12 Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

1. Three particles in an atom are \_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. The two which are charged are the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (positive) and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (negative).

3. Like charges (ones that are both positive or both negative) \_\_\_\_\_\_\_\_\_\_\_\_\_\_ each other.

4. Opposite charges \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ each other.

5. Individual atoms can become charged by gaining and losing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. If an atom loses one \_\_\_\_\_\_\_\_\_\_\_\_\_\_, the atom gets a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ charge and is called an \_\_\_\_\_\_\_\_.

An object can become charged by touching another charged object (charging by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_), or through friction. Certain materials like rubber and plastics tend to gain electrons, acquiring a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ charge, when rubbed against other materials. Materials such as wool and hair tend to lose electrons, acquiring a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ charge.

6. The unit for *electrical potential* or *potential difference* is the \_\_\_\_\_\_\_\_\_\_\_. This can be thought of as how much each electron is pushed up in energy, just like giving gravitational energy to a brick by lifting it.

7. The flow of electrons or protons is called electric \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which is measured in \_\_\_\_\_\_\_.

8. Current can flow in one direction and be called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or it can slosh back and forth many times each second, and be called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

9. All materials have some *resistance* to electric current flowing. This resistance is measured in units of \_\_\_\_\_\_\_\_, which has the symbol **Ω** (“Omega”) Materials which have a lot of resistance (such as glass and rubber) are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and materials which let electricity flow easily (such as copper and gold) are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

10. Compared to a low voltage battery, a stronger battery with higher voltage will push more current through a certain wire. Higher voltage → Higher \_\_\_\_\_\_\_\_\_\_\_\_\_\_

∙ On the other hand, if we have a certain battery, it will push a lot of current through something with little resistance, and it won’t be able to push many electrons through a piece of glass which has high resistance.

11. Higher \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ → Lower current

**Ohm’s Law: Current = Voltage Amperes = Volts**



**Resistance ohms**

Most electrical outlets in the U.S. are at approximately \_\_\_\_\_\_ Volts. If you plug in a fan which has a resistance of 60 Ω, the current will be 120V ÷ 60Ω = 2 Amperes (or “2 amps”) A battery acts as a “pump” for electrons, pushing them out one end (the *negative terminal*) and pulling them in the other end (the *positive terminal*). The amount that the battery pushes the electrons depends on its voltage.

A circuit comes from the same root word as circle and circumference (and circus) – it means “circle”.

YOU HAVE TO GO ALL THE WAY AROUND!! If you don’t get all the way around, its not a complete, or “closed” circuit. It’s broken, or “open”.

Electrons need to go from the negative end of the battery, around through wire, or some other conductor, and back into the battery’s positive end. They can go through light bulbs and radios and wires, but they have to get back to the battery to start the circuit over again.

12. Draw the symbols for these circuit elements:

**Battery Light bulb Resistor Voltmeter Ammeter**

**(across element) (inserted in circuit)**

**+**

-

**Open Switch (OFF) Closed Switch (ON)**

13. In the large rectangle, draw a complete circuit with at least one of each circuit element above.

Label elements with logical units. Is the circuit on or off?

You can have more than one light bulb or resistor (or anything else) in a circuit. You can hook them up one after the other, or next to each other in different paths.

∙ One after the other is called “in series” (like TV show episodes).

∙ In different paths, next to each other, is called “in parallel”.

14. Draw 2 resistors in series: 15. Draw 2 resistors in parallel: 16. Draw a closed circuit with 1

battery and 3 resistors in series:

***Electricity Notes, Part I Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

1. Three particles in an atom are \_\_protons\_\_, electrons and \_\_neutrons\_\_\_

2. The two which are charged are the proton (positive) and electron (negative).

3. Like charges (ones that are both positive or both negative) repel each other.

4. Opposite charges attract each other.

5. Atoms can become charged (become ions) by gaining and losing electrons If an atom loses one electron, the atom gets a positive charge and is called a cation. If an atom gains one electron,

the atom gets a negative charge and is called an anion. **PROTONS DON’T MOVE. NO. NO!**

6. The unit for *electrical potential* or *potential difference* is the voltage This can be thought of as how much each electron is pushed up in energy, just like giving gravitational energy to a brick by lifting it.

7. The flow of electrons or protons is called electric current which is measured in Amperes.

8. Current can flow in one direction and be called direct current (DC) or it can slosh back and forth many times each second, and be called alternating current (AC)

9. All materials have some *resistance* to electric current flowing. This resistance is measured in units of ohms which has the symbol **Ω** (“Omega”) Materials which have a lot of resistance (such as glass and rubber) are called insulators and materials which let electricity flow easily (such as copper and gold) are called conductors.

10. Compared to a low voltage battery, a stronger battery with higher voltage will push more current through a certain wire. Higher voltage → Higher current

∙ On the other hand, if we have a certain battery, it will push a lot of current through something with little resistance, and it won’t be able to push many electrons through a piece of glass which has high resistance.

11. Higher Resistance → Lower current

**Ohm’s Law: Current = Voltage I = V Amperes = Volts**



**Resistance R Ohms**

**Voltage = Current • Resistance V = I•R**

Most electrical outlets in the U.S. are at approximately 120 Volts. If you plug in a fan which has a resistance of 60 Ω, the current will be 120V ÷ 60Ω = 2 Amperes (or “2 amps”)

∙ A battery acts as a “pump” for electrons, pushing them out one end (the *negative terminal*) and pulling them in the other end (the *positive terminal*). The amount that the battery pushes the electrons depends on its voltage.