**Current, Voltage and Resistance Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

* When Electrons flow through a circuit, a few things are happening with them…
  1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Current:

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_ (\_\_\_) is a measure of current
* It is a measure of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_that flows past a point in a circuit in \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* It is measured by a device called an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* An ammeter needs to be \_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with the rest of the circuit
* Current is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ if \_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ of charge flows past a point in \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5) Draw a diagram showing a wire with a high current and a wire with a low current (HINT: use the diagram on the PowerPoint slide to help you if needed).

Voltage:

* Is a measure of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ supplied to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ source (the supply voltage)
* Also a measure of the amount of energy \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by the charges as they pass through a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ such as a light globe
* Measured using a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (units are volts, or \_\_\_\_\_\_)
* The voltage is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ if
  + the electrons are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_a lot of energy

or

* + are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with a lot of energy by a power source.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a re connected to either side of a component, \_\_\_\_\_\_\_\_\_\_\_ in line with the circuit.

6) Draw a diagram showing how you would connect a voltmeter to a simple circuit to measure the voltage used by a single globe. Assume the circuit contains a battery, a switch and a globe connected in series.

Supply Voltage

* Electrons are supplied with energy from a power source which has its own \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ supply voltages give electrons a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to get around the circuit
* Sometimes a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is used to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the voltage from 240V in Australia to a lower voltage (like 19V for laptops)

Voltage Drop

* Because components use \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (e.g. a light), there is a \_\_\_\_\_\_\_\_\_\_\_\_\_ in voltage, as some of the electrons energy is used.

Resistance

* Electrons moving around a circuit are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that make up the wires
* Resistance measures how \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ it is for an electric current to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ through wires
* A \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ means that electrons find it \_\_\_\_\_\_\_\_\_\_\_\_\_ to pass through the material
* Resistance is measured using the unit \_\_\_\_\_\_\_\_\_\_\_\_ (\_\_\_\_\_)

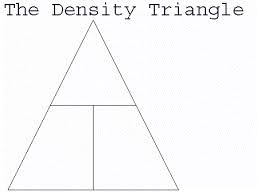
**~~Resistance and voltage rely on each other~~**

1. ~~Electrons don’t bump into much if they pass through materials with \_\_\_\_\_\_\_\_\_ resistance, so there is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ drop in energy (or voltage)~~
2. ~~In \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_resistance materials, a lot of energy is lost when the electrons bump into things, so there is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ drop in voltage~~

* ~~Resistance and current are reliant on one another too:~~
  1. ~~As the resistance of a component \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, fewer electrons can get through it every second, which \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the current~~
* ~~Resistance depends on:~~
  1. ~~\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_~~
  2. ~~\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_~~
  3. ~~\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_~~

7) Write out the formula relating voltage, resistance and current below:

8) Fill in the triangle to help with re-arranging this equation.



**Voltage Equation Practice Problems**

The formula we are going to practice today is the voltage equation:

voltage= current \* resistance

V= I\*R

|  |  |  |  |
| --- | --- | --- | --- |
| **Quantity Symbol** | **Quantity Term** | **Unit** | **Unit Symbol** |
| V | Voltage | volts | V |
| I | Current | amperes | A |
| R | Resistance | ohms | Ω |

**Sample Problems:**

Sample problem 1) A lava lamp has a resistance of 5 ohms and a current of 2 A. What is the voltage across the bulb?

V= ?

I= 2A

R= 5 Ω

V= I\*R = 2\*5 = 10V

Sample problem 2) How many ohms of resistance must be present in a circuit that has 240 volts and a current of 12 amps?

R= ?

V= 240V

I= 12A

V 240

V= I\*R => R= --- = ----- = 20 Ω

I 12

Sample problem 3) A circuit contains three, 3 volt battery and a bulb with a resistance of 3 ohms. Calculate the current.

I= ?

V= 9V

R= 3 Ω

V 9

V= I\*R => I= --- = ---- = 3 A

R 3

**Problems for you to try:** Complete the following practice problems. You MUST show ALL the work outlined in the steps in the example problems.

1. How much current is in a circuit that includes a 9-volt battery and a bulb with a resistance of 3 ohms?
2. A circuit contains a 1.5 volt battery and a bulb with a resistance of 3 ohms. Calculate the current.
3. A circuit contains two 1.5 volt batteries and a bulb with a resistance of 3 ohms. Calculate the current.
4. What is the voltage of a circuit with 15 amps of current and toaster with 8 ohms of resistance?
5. A light bulb has a resistance of 4 ohms and a current of 2 A. What is the voltage across the bulb?
6. How much voltage would be necessary to generate 10 amps of current in a circuit that has 5 ohms of resistance?
7. How many ohms of resistance must be present in a circuit that has 120 volts and a current of 10 amps?
8. An alarm clock draws 0.5 A of current when connected to a 120 volt circuit. Calculate its resistance.
9. A portable CD player uses two 1.5 V batteries. If the current in the CD player is 2 A, what is its resistance?
10. You have a large flashlight that takes 4 D-cell batteries. If the current in the flashlight is 2 amps, what is the resistance of the light bulb? (Hint: A D-cell battery has 1.5 volts.)

