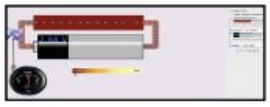
Lab (Day 2): Current is inversely proportional to resistence

Name: _____ Date: _____ CP: _____

Virtual Circuit Lab

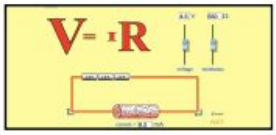
Learning Goals: Students will be able to understand Ohm's Law. Students will be able to see the relationship between voltage, current, and resistance.

Go to ➔**Battery-Resistor Circuit**. Click on the green "Run Now" button. The simulation should look like the picture to the right.



1. Change the resistance and voltage. Observe what happens to the current. Note the relationship you observed between each of the following: (direct, inverse, none)
   a. resistance and current = _____
   b. voltage and current = _____

Go to ➔Ohm's Law. Click on the green "Run Now" button. The simulation should look like the picture to the right.



2. What is the current through a resistor with the following resistances? Let voltage = 6 V
   a. R = 100 ohms I = _____ mA(current) b. R = 300 ohms I = _____mA(current)
3. Now, determine the current through the wire with the following volts. Let resistance = 500 ohms
   a. Volts = 3 V I = _____mA(current) b. Volts = 6V I = _____mA(current)
4. Think about the formula (V=IR), does this make sense according to this formula? Explain! (Be sure to include the relationship between resistance and current, and the relationship between voltage and current in your answer)

Go to ➔Circuit Construction Kit (DC Only). Click on the green "Run Now" button. The simulation should look like the picture to the right.

5. Construct a circuit with one battery, four wires, and one load (light bulb). Sketch your circuit below. Label the battery, load, and conductor (wire). This is an example of a simple circuit.
6. Click on "show values" and calculate the current using Ohm's Law (V=IR). Show all work in the space below. Place an ammeter in series with the circuit and confirm your answer.
7. Select the voltmeter and hook it up to the battery (red is positive). What is the voltage (potential energy) across the battery? You should NOT get a negative number _____ V
8. Leave the red lead in place on the battery; place the black lead on the load end (the light bulb) where the electrons flow into the load. What is the voltage (potential energy)? _____ V
9. The potential energy in the circuit is supplied by the _____. Potential energy is transferred into kinetic energy when the load releases energy as _____.

10. Think about the energy supplied by the battery and the energy used by the load. What must the battery do to constantly keep the load lit?

11. Add another load to your circuit. Use the voltmeter to determine the voltage drop across the original load (load 1) and the additional load (load 2).

    a. load 1 _____ V b. load 2 _____ V

12. What happened to the brightness of the original load when you added another bulb to the circuit?

13. Light bulbs have filament in them that act as resistors. Resistance in the filament makes the light bulb light up. Notice the reading on the ammeter in series with the 2-load circuit. Did the current increase, decrease, or stay the same. Why did the reading on the ammeter change? (Think about Ohm's Law and look at your answers to #1)

14. Add in another battery to your circuit. Use the voltmeter to measure the voltage across each load.

    a. load 1 _____ V b. load 2 _____ V

15. What happened to the brightness of each load when you added another battery to the circuit?

16. Notice the reading on the ammeter with the additional battery. Did the electric current change with the addition of another battery? Explain why this happened. (Think about Ohm's Law and look at your answers to #1)

17. Construct a parallel circuit with two batteries next to each other and one load in each pathway. Sketch your parallel circuit.

18. Add another load to one of your pathways. Notice the brightness of the two loads one pathway and the brightness of the single load in another pathway. What can you conclude about loads in different pathways in a parallel circuit opposed to loads in a series circuit?

19. **Real world application:** Suppose you're wiring a Doll House for a younger sibling. You want the lights in the Doll House to be as bright as possible. You have a choice between two wires. Wire **A** is slightly thicker than wire **B**. Which wire should you choose for your Doll House? Why? Be sure to use concepts and vocabulary used in this lab in your answer.

20. **Reflection of Learning:** Time to summarize what you have learned. Explain Ohm's law. Be sure to include the following vocabulary words in your explanation: Ohm's Law, current, current, resistance, voltage, and circuit.