**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Electricity Investigation**

Answer the questions using the websites provided. Use complete sentences!!

**Open the DC only circuit simulator**

* **Go to: Circuit Web Quest Part 1**

[**http://phet.colorado.edu/en/simulation/circuit-construction-kit-dc-virtual-lab**](http://phet.colorado.edu/en/simulation/circuit-construction-kit-dc-virtual-lab)

**Directions:**

**Choose the RUN NOW option**

**Tools to build circuit are in the white box on the right side of the screen**

**Each tool has a positive and negative side. Make sure you have both sides connected to make a circuit!**

**To remove parts or change voltage, resistance, etc…..right click on the part for more options!!**

 1. Find a way to make a single light bulb light up with as FEW parts hooked up as possible.

 When electricity flows through wires and makes something work, like a light bulb, it is

 called a circuit.

**Sketch your circuit below**:

2. Go to the grab bag and play with the different objects. Find out which objects allow

 electricity to flow and fill in the data table:

|  |  |
| --- | --- |
| Objects that allow electricity to flow **(conductors)** | Objects that do NOT allow electricity to flow **(insulators)** |
|  |  |

 3. What do the conductors have in common?

4. What do the insulators have in common?

 5. **Experiment** with the simulator; see what you can make it do!!! Build different circuits.

 How can you make light bulbs glow brighter?

 How can you make light bulbs glow dimmer?

 6. Use the voltage meter and ammeter. (use voltage meter on battery, attach ammeter to circuit)

 **Sketch the circuit you created and record your readings.**

**Directions:**

**Create a circuit with batteries, wires and resistors- no light bulbs!**

7. Complete the table below by:

* + Add 1 resistor to your circuit. Right click to change the resistance
	+ Record the resistance in the table below.
	+ Measure the voltage (use voltmeter on the battery to measure)
	+ Measure the current through each resistor (use the ammeter to measure)
	+ Calculate the Total resistance using the formula given.
	+ Add a second resistor & repeat process. Then add a 3rd resistor and repeat process.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Resistor | **Individual**resistance(ohms)**R** | **Voltage**(Volts)**V** | **Current**(amps)**I** | **Total Resistance** inthe circuit  **R=V/I** |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |

**Battery-Resistor Circuit**

* **Go to: Circuit Web Quest Part 2**

[**http://phet.colorado.edu/en/simulation/battery-resistor-circuit**](http://phet.colorado.edu/en/simulation/battery-resistor-circuit)

**Directions:**

**Choose the RUN NOW option**

**Control Panel: Check “show inside battery” in upper right hand corner.**

8. What must happen to the voltage and resistance for the circuit to get hot?

9. What happens to the current when the circuit gets hot?

 **(Current reading is in lower left corner- AMPS)**

10. What must happen to the voltage and resistance for the circuit to get cold?

 11. What happens to the current when the circuit gets cold?

**Ohm’s Law**

* **Go to: Circuit Web Quest Part 3**

[**http://phet.colorado.edu/en/simulation/ohms-law**](http://phet.colorado.edu/en/simulation/ohms-law)

**Directions:**

**Choose the RUN NOW option**

12. What happens to I when V increases?

13. What happens to I when R increases?

14. Let Voltage = 6.0 V. How many 1.5 V batteries do you need? \_\_\_\_\_\_\_\_\_\_\_

 Let Resistance = 745-750 ohms.

Calculate the current (I = V / R). \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Does your answer match with the simulation’s answer? (**mA means milliamp……..1000 mA = 1 A**)

15. Describe the relationship between I and R.

 16. Fill out the tables below and check your work in the simulation

 ***Remember, the simulation shows milliamps.***

 ***You should show Amperes!! (*mA means milliamp……..1000 mA = 1 A)**

 **V = I \* R**

|  |  |  |
| --- | --- | --- |
| 8.0 V |  **A** | 800 Ω |
| 2.0 V | .044 A |  **Ω** |
|  **V** | .0058 A | 430 Ω |

**Ohms Practice Questions**

 17 .The 12V battery in your car operates a 25 amp car stereo. What is the resistance of this

 stereo system? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 18. A “2D” flashlight runs on 3.0V. What is the current through the bulb if resistance is 15 Ω?

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 19. How many volts must an iPod charger provide to charge an iPod using .85 Amps at 35 Ω?

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_