**HSA Brownsville Science Department**

Name:

Class:

**Circuits Virtual Lab**

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**Goal of the experiment:** To understand & explore circuit elements, equivalent resistance, current and voltage calculations.

**Needed materials:** A laptop or desktop with Java software, PhEt Circuits Lab simulation, and a calculator.

Download the simulation: <https://phet.colorado.edu/en/simulation/legacy/circuit-construction-kit-ac>

**Step 1: Series Circuit.** Create a series circuit by pulling resistors from the side, and then right click on the resistor.

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| Change the resistance. | Pick any three different value of your choice. And set  the voltage by right clicking to any value of desire. Build  a circuit as in above, you can use your imagination and  alter the diagram. You can replace one resistor with a  light bulb and change the resistance. A switch can also  be added. |  |

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|  |  | | | | | Theoretical Value | | | | Experimental Value | | | | Pull a volt meter from the  side to check individual  voltages. Connect ampere  meter to measure current. |
|  | R1 | R2 | R3 | Req | V | I | V1 | V2 | V3 | I | V1 | V2 | V3 |
| Set 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Set 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |

**Step 2: Parallel circuit**. Use above steps to build a three resistor system of any choice and desired voltage.

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|  | Build a circuit similar to the  one left. Change resistors and  voltage and calculate  theoretical values.  Then use a voltmeter and  ampere meter to have  experimental values to  compare.  A sample set up can be seen on  the right. |  |

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|  |  | | | | | Theoretical Value | | | | | | | Experimental Value | | | | | | | |
|  | R1 | R2 | R3 | Req | V | Im | I1 | I2 | I3 | V1 | V2 | V3 | Im | I1 | I2 | I3 | V1 | V2 | V3 |
| Set 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Set 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Use back side for result and commentary

**Step 3: Result and commentary:**

**Explain the experiment step by step what you did. Did your theoretical and experimental calculations match?**

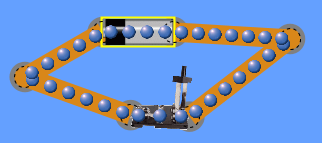
**If not, explain why. Add improvements if any.**

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**Question 1: Is the equivalent resistance always lower than any resistor in parallel connection?**

**Question 2: Which connection should be chosen for Christmas lights? Series or parallel? Why?**

**Question 3: What type of connections do we use in our homes, offices and daily life? Why?**

**Question 4: Build a short circuit and explain what happens.**