**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 setthe voltage by right clicking to any value of desire. Builda circuit as in above, you can use your imagination and alter the diagram. You can replace one resistor with alight 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 individualvoltages. 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 onthe 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.**