Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Current, Voltage and Resistance Lab**

Science 30

**Part 1: Current**

**Problem:** Does the electric current flowing through a circuit vary at different points within a circuit?

**Materials**:

|  |  |  |
| --- | --- | --- |
| Power Supply | Switch | 4.8 V lamp |
| 4 leads | Multi-meter |  |

**Procedure**:

1. Set up the circuit that is drawn out below
2. Place the multi-meter in position A (between the battery and switch)
3. Take multi-meter reading with the switch open and then closed. Record readings in the observation chart
4. Repeat step three with multi-meter in position B and C

**Observations**:

A

B

C

**Chart:**

|  |  |
| --- | --- |
| **Ammeter Location** | **Electric Current (A)** |
| **Switch Open** | **Switch Closed** |
| **A** |  |  |
| **B** |  |  |
| **C** |  |  |

**Analysis:**

1. What effect did opening and closing the switch have on the current?
2. What is the role of the switch?
3. Explain what the electric current is at different places in the circuit and why the readings for amperage may be different.

**Part 2: Voltage**

**Problem:** How does the voltage (potential difference) across different components within a circuit compare?

**Materials**:

|  |  |  |
| --- | --- | --- |
| Power Supply | Switch | 4.8 V lamp |
| 6 leads | Multi-Meter | Two 2.5 V lamps |

**Procedure**:

1. Set up the circuit as shown below. Use the 2.5 V lamps to make sure it works
2. Connect the voltmeter around the source. Keep the switch closed. One lead before the battery and one lead after the battery
3. Measure the voltage and record.
4. Repeat step two and three with the voltmeter at position B, C, D and E and record results
5. Replace the lamp at position D with 2.7 V. Compare the brightness of the 4.8 V bulb with the original 2.5 V.
6. Take the voltage in position D with the 4.8 V bulb and record.

**Observations**:

A

B

C

D

E

**Chart:**

|  |  |
| --- | --- |
| **Location of Voltmeter** | **Voltage (V)** |
| A – Around Battery |  |
| B – Around Switch |  |
| C – Lamp one |  |
| D – Lamp two |  |
| E – Both Lamps |  |
| D – With 4.8 V lamp |  |

 **Analysis:**

1. What part of the circuit provided the electrical energy?
2. What part of the circuit used the electrical energy?
3. Compare the voltage across the battery (A) to the voltage across the load (E). How does the energy supplied compare to the energy used?
4. How does the potential difference across bulb C and bulb D compare to across both bulbs (E)?
5. How did the brightness of the 2.5 V bulb compare to the 4.8 V bulb?

**Part 3: Resistance**

**Problem**: What are the properties that make good resistors?

**Materials:**

|  |  |  |
| --- | --- | --- |
| Power Source | Multimeter - current | Lamp |
| Nichrome wire  | Copper wire | 4 alligator clips |

**Procedure:**

1. Hook up the series circuit as in the diagram below **BUT WITHOUT THE RESISTOR**. Make sure the lamp works.
2. Add the copper board in the resistor position by connecting one wire to the copper wire and the other wire very close to the position of the first wire you connected to the resistor.
3. Record the brightness of the lamp and the current reading in the observation chart.
4. Slowly run the second alligator clip down the copper board (keeping in contact with the copper wire). This is making you increase the distance between the two wires connected to the copper wire.
5. Watch the brightness of the bulb and the current reading.
6. Replace the copper board with the nichrome wire. Repeat steps #2 to #5.
7. Record all results on the observation chart.

**Circuit Diagram:**



**Observations:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Wire** | **Position A** | **Position B** | **Position C** |
|  | Brightness | Reading (A) | Brightness | Reading (A) | Brightness | Reading (A) |
| **Copper** |  |  |  |  |  |  |
| **Nichrome** |  |  |  |  |  |  |

**Analysis:**

1. Which type of wire would be the best resistor?
2. Do you think the wire chosen in analysis question #1 is a good conductor or a fair conductor? Why?
3. As you increased the length of the wire, what happened to the resistance?
4. As you increased the length of the wire, what happened to the current?
5. A student finds a resistor in an old transistor radio. When the resistor is attached to a 1.5 Vcell, the flow of current is measured at 0.025 A. What is the resistance? SHOW WORK!
6. The same resistor from question 6 is attached to FOUR 1.5 V cells, the current is measured at 0.1 A. What is the resistance? SHOW WORK!
7. When the resistor is attached to a 9 V battery, the current is measured at 0.15 A. What is the resistance? SHOW WORK!