**Make: Electronics**

**Student Learning Guide**

**Student Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Activities Time Line**

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

|  |  |  |  |
| --- | --- | --- | --- |
| Class | Experiment # | Activity Name | Checklist |
| 1 | Experiment 1 | Taste the Power pg. 7  Measuring Your Tongue pg. 9  Theory #1-3 |  |
| 2 | Experiment 2 | Let’s Abuse a Battery pg. 13  How to Blow a Fuse pg. 15  Theory # 4-5 |  |
| 3 | Experiment 3 | Your First Circuit pg. 18  Theory # 6-7 |  |
| 4 | Experiment 4 | Variable Resistance pg. 22  Theory # 8-15 |  |
| 5 | Experiment 5 | Let’s Make a Battery pg. 34  Theory #16-18 |  |
| 6 | Experiment 6 | Very Simple Switching pg. 50  Theory # 19-21 |  |
| 7 | Experiment 7 | Investigating a Relay pg. 60 |  |
| 8 | Experiment 8 | A Relay Oscillator pg. 66  Theory # 22-25 |  |
| 9 | Experiment 9 | Time and Capacitors pg. 75  Theory #26 |  |
| 10 | Experiment 10 | Transistor Switching pg. 84  Theory #27 |  |
| 11 | Experiment 11 | Light and Sound pg. 91 |  |

**Theory:**

**Experiment #1**

1. What are ohms, kilohms and megohms?
2. Define:
   1. Insulator –
   2. Conductor –
   3. Electrons
3. How is a battery like a pair of water reservoirs?

**Experiment #2**

1. Define:
   1. Electrolyte
   2. Voltage
   3. Amps
   4. Volts
   5. Direct current
   6. Alternating current
2. Why didn’t your tongue get hot when you touched the battery to it?

**Experiment #3**

1. Define:
   1. Tolerance –
2. What is the purpose of a resistor?

**Experiment #4**

1. Define:
   1. Potentiometer –
2. What is the result if you add up all the potential differences across all the devices in the circuit?
3. What is Ohm’s Law?
4. What do the following represent?
   1. I –
   2. V –
   3. R –
5. How would you find the value of I? of R?
6. What is the value of the resistor in figure 1-61?
7. Define:
   1. Watt –
   2. Joule –
8. What is the electrical definition of a watt?

**Experiment #5**

1. Define:
   1. Electrochemical –
   2. Galvanized –
2. What does mutual repulsion refer to?
3. Write down the formula used to express the number of electrons that flow through a piece of wire each second.

**Experiment #6**

1. How do you measure continuity on a switch?
2. Draw the following symbols:
   1. a single-throw, double-pole switch (STDP)
   2. a battery with a positive and negative end
   3. 100V AC power
   4. US symbol for 220 ohm resistor
   5. US symbol for 470 ohm potentiometer
   6. push button where pressure closes the contacts and the release of pressure opens the contacts
3. On a schematic where do you usually find the positive power and where do you find the negative power?

**Experiment #8**

1. What is a farad?
2. Why should you be careful when working with capacitors?
3. Write down the symbols used for capacitors.
4. Why won’t the circuit shown in fig. 2-76 work?

**Experiment #9**

1. Describe the time constant formula.

**Experiment #10**

1. Why shouldn’t you use two hands when working with the switch?