**KEY - LESSON 3: Meters**

**Activity 1: Amp Meter & Volt Meter**

**Build Project 323 – 3mA Meter**

1. Turn on slide switch (S1) with the meter (M2) on low. The meter reads 9.5 (approximately) mA.
2. Remove the 3 connector wire snap piece that links the 1K Ω resistor to the other 3 connector wire snap. Replace it with the red LED (D1-arrowing pointing toward the bottom of the grid.) The reading on the meter (M2) is 6 mA(approximately).
3. The resistor that is in parallel with the meter is 100 Ω.
4. Placing the 100 Ω resistor in parallel with the meter increases the meter’s range 10 times.
5. What do you think will happen to the meter reading if you replace the 1K Ω resistor with one of lower value to both the brightness of the LED and the meter reading? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ What are your results? The LED is very bright
6. Repeat with a resistor with a higher resistor value. What are your results? The light is dim or may not turn on at all.

**Build Project 324 – 0-3V Voltmeter**

1. Set the meter (M2) to low. Insert the battery holder between points A and B. The reading on the meter is 3.
2. Find an old set of batteries and repeat the project.

**Activity 2: Meters with Adjustable Resistors & Photoresistors**

**Build Project 325 – Function of Adjustable Resistor**

An adjustable resistor is a normal resistor with an additional arm contact. The arm moves along resistive material and stops at the desired resistance. It controls the amount of current (amps) flowing through the circuit.

1. The meter (M2) reading at the lowest point is 2.5 (approximately). Highest point 9.5 (approximately).
2. Describe what happens to the meter as you change the position of the slider on the variable resistor (RV). In this circuit, as the resistance increases the current decreases.

**Build Project 486 – Simple Illumination Meter (Light Meter)**

The amount of light changes the resistance of the photoresistor, which affects the current through the meter.

1. Set the variable resistor (VR) to the far **left**. Turn on the slide switch (S1). The meter (M2) reading is 10.
2. The photoresitor (RP) is very sensitive to light. Describe what happens to the needle on the meter as you wave your hand over the photoresistor. The needle moves rapidly between 0 and 10.
3. Move the variable resistor (VR) to the far **right**. Turn on the slide switch (S1). The meter (M2) reading is 2.5.
4. Describe the difference in the meter (M2) reading when you wave your hand over the photoresistor (RP). The needle moves slowly between 0 and 2.5.

**Activity 3: Measuring the Resistance of Different Loads**

**Build Project 494 – Resistor Measurement**

1. Set the meter (M2) to the **low** setting.
2. Attach **one** jumper cable to points A & B. Adjust the slide on the variable resistor (VR) so the meter points to 10. Remove the cable.
3. Test the 100 Ω resistor. The meter reading is 10.
4. In a circuit, any load also acts as a resistor. Test other resistors from your kit and record results in the table below.

|  |  |
| --- | --- |
| **Type of Resistor** | **Meter Reading** |
| Speaker (SP) | 10 |
| 5.1K Ω resistor (R3) | 8.5 |
| Music IC (U1) | 8.5 |
| 100K Ω resistor (R5) | 1.5 |
| LED (D1) arrow pointing to right | 7 |