Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Class \_\_\_\_\_\_\_\_\_\_ ****

**LESSON 3: Meters**

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

* The meter has a + and - polarity marking to indicate which direction the current will move the pointer.
* Always keep the switch on LOW unless told to do so in the instructions.
* The meter will measure current (amps) when connected in a series circuit.
* If the current is higher than 300µA in the low setting, the higher current may be measured by connecting a low value resistor in parallel.

**Build Project 323 – 3mA Meter**

1. Turn on slide switch (S1) with the meter (M2) on low. The meter reads \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mA.
2. The resistor that is in parallel with the meter is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Ω. Placing the 100 Ω resistor in parallel with the meter increases the meter’s range 10 times.
3. Extension: Remove the vertical 3-snap connector (first layer-left side of the board) linking the 1K Ω resistor to the horizontal 3-snap connector (second layer-bottom of the board). Replace it with the red LED (D1-arrowing pointing toward the bottom of the grid.) The reading on the meter (M2) is now \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mA. Why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

The meter will measure voltage when connected in parallel in a circuit. It can measure voltages up to .3V, but higher voltages may be measure by connecting it with a high value resistor.

1. Set the meter (M2) to low. Insert the battery holder between points A and B. The reading on the meter is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. If you use new batteries, you can use this reading for a comparison
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 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Highest point is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. Describe what happens to the meter (M2) as you change the position of the slider on the variable resistor (RV). In this circuit, as the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ increases the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 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 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. The photoresistor (RP) is very sensitive to light. Describe what happens to the needle on the meter (M2) as you wave your hand over the photoresistor. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Move the variable resistor (VR) to the far **right**. Turn on the slide switch (S1). The meter (M2) reading is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Describe the difference in the meter (M2) reading when you wave your hand over the photoresistor (RP). \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

**Build Project 494 – Resistor Measurement**

1. Set the meter (M2) to the **low** setting. Attach **one** jumper wire to points A & B. Adjust the slide on the variable resistor (VR) so the meter points to 10. Remove the wire.
2. Test the 100 Ω resistor. The meter (M2) reading is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. 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) |  |
| 5.1K Ω resistor (R3) |  |
| Music IC (U1) |  |
| 100K Ω resistor (R5) |  |
| LED (D1) arrow pointing to right |  |