

Name: _____

Date: _____

Powering Small Loads

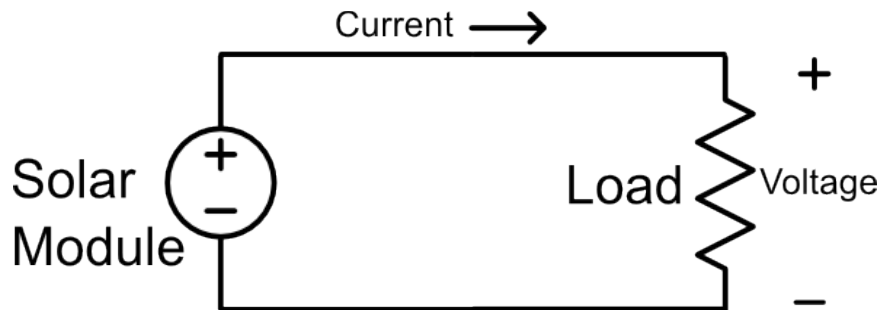
Look at the devices you've been given. These will be your "loads" throughout this lab. Anything that requires power to run can be referred to as a load. Start by deciding in what order you will test their power consumption and then write down the names of your loads in Table 1.

Now make a hypothesis. Which device do you think will draw the most power out of the solar module? Why?

Hypothesis: _____

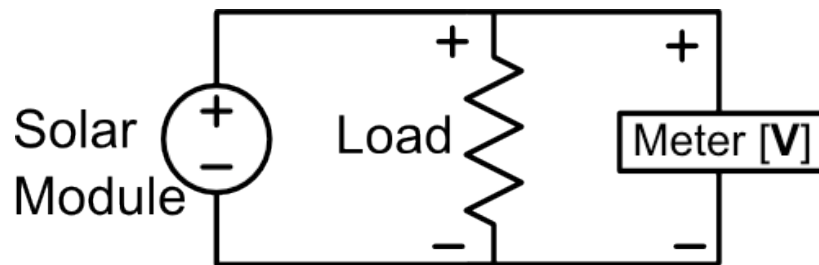
Procedure:

Step One: Set up your circuit



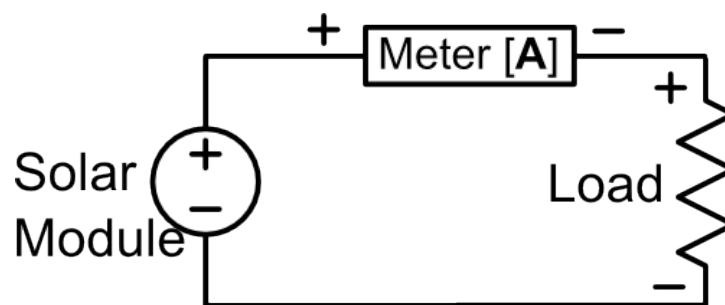
- Connect the wires from the solar module to the wires of the DC motor.
- Put the solar module into the light to make sure that your load is working.

Step Two: Measure the voltage across your load



- Connect the wires from the multimeter to the wires of the load so that the meter takes a voltage reading **across** the load as shown in the diagram above.
- The red wire from the meter should connect to the load at the same place as the red wire from the solar module. Similarly, the black wire from the meter should connect to the black wire from the solar module. Use the alligator clips to make this easier.
- Set the multimeter dial to measure DC voltage (V $\overline{\text{---}}$). Remember to select the number that is closest to, but greater than your expected voltage number. If you're not sure, make your best guess and adjust depending on what you see on the multimeter.
- Put the solar module into the light.
- Record your voltage reading in Table 1 and any other observations about your voltage reading.

Step Three: Measure the current through your load



- Connect the multimeter to your circuit so that it is in the same loop as your load as shown in the diagram above.
- To do this, connect the red wire from the meter to the red wire from the solar module. The black wire from the meter should connect to the red wire of your load. The black wire of your load should then connect to the black wire from the solar module.
- To check that you've done this correctly, trace the circuit with your finger starting from the red wire of the solar module. You should pass through both the meter and the load before returning to the black wire of the solar module. This is how the current will travel.
- Set the multimeter dial to measure DC current (A $\overline{\text{---}}$). Remember to select the number that is closest to, but greater than your expected current.
- Put the solar module into the light.
- Record your current reading in Table 1 and any other observations about your current reading.

Table 1:

Load Name	Measured Voltage	Measured Current	Calculated Power	Calculated Resistance	Measured Resistance

Before moving on, repeat steps 1-3 for your other two loads so that you have filled in columns 1-3 of Table 1 completely.

OBSERVATIONS:

Step Four: Calculate the power used by your loads

- Below is given the “power formula” which allows us to calculate power from our voltage and current measurements:

$$\text{Power} = \text{Current} \times \text{Voltage}$$

- Using the power formula and the voltage and current you recorded in Steps Two and Three, calculate the power used by each of your loads. Record your answers in the fourth column of Table 1.

Step Five: Calculate the resistance of your loads

- Below is given “Ohm’s law” which allows us to calculate resistance from our voltage and current measurements:

$$\text{Resistance} = \text{Voltage} / \text{Current}$$

- Using Ohm’s law and the voltage and current you recorded in Steps Two and Three, calculate the resistance of each of your loads. Record your answers in the fifth column of Table 1.

CONCLUSION QUESTIONS:

Think about all of the observations that you made throughout this activity and think about what they tell you about the electricity flowing through your circuit then write a conclusion, which answers the following questions.

What did you notice about the voltage readings you took across your loads?

What did you notice about the current readings you took across your loads?

Which load consumed the most power? Was your hypothesis correct?

Which load had the greatest resistance? How is the resistance of the load related to the voltage, current and power?

What other ideas or questions do you have? If you were going to do another experiment to test something about your circuit, what would you want to do? How would you set your experiment up?