Light Bulb and Diode

For an Ohmic conductor, a graph of I vs. V is a straight line with a slope of I/V (1/R) that goes through the origin. Here you will test a light bulb and a diode which decidedly aren't ohmic.

1. You will need two multimeters, one set up to read current, and the other, voltage.
2. Notice that the ammeter is connected so that it is reading the current through whatever it is you are testing, and the voltmeter is reading the voltage across the device. (Ammeters are in series - voltmeters in parallel)
3. For each of the devices you will be by manipulating the voltage, and measuring the current.

Use the voltage ranges posted at the lab station.

Light Bulb: Turn your voltage down, and adjust slowly, don't burn out my bulb. (Don't go over 6 V)

Diode: These will do nothing in one direction (don't go beyond about 6 volts looking) and in the other direction they will do something dramatic around about **.6** volts current-wise. Be ready for it. Do not exceed **1** Amp and your diode should be fine. If you get no response in either direction, then the diode is no more. You will collect all of your data points in the direction that something happens.

As you gather data, try to record exactly what the meters say simultaneously, and don't worry about getting exactly the value you are supposed to. (i.e. if you are trying to get the current for 0.200 volts, and it says 0.206 volts that's close enough - just record 0.206, and the exact current)

4. Make two nice I vs V graphs using Google Sheets. Put your data and your graph on the same sheet as the graph. (Maybe use landscape) Your graph should have vertical gridlines as well as horizontal, as well as a definite plot frame all around the graph. (Be careful, Sheets likes to make graphs you can't use...) You will need to print these on a PC in the back of the room. You will print out two sheets of paper, one for the light bulb data and graph, and the other for the diode data and graph.
5. On the graph of the light bulb you will see that there are really two different slopes (more or less) so draw two different straight lines to represent these two resistances, and using the end points of the line, keeping in mind that you collected current in mA (1000 mA = 1 A), and that resistance is the inverse of the slope, calculate the differential resistance for these two regimes. For the diode, do the same thing for the points where the current takes off. Just do one line for the diode.
6. Answer these •2 questions •citing data or referring to specific regions of your graph to back up what you say:

   A. •What happens to the resistance of the light bulb as the current or voltage increases? (On an I vs V graph, the slope is the inverse of resistance) •Why does it change the way it does? (What happens to the resistivity of a metal as the temperature increases????)

   B. Look at your data from the diode. Isn't it wacky? •What would a diode be useful for?