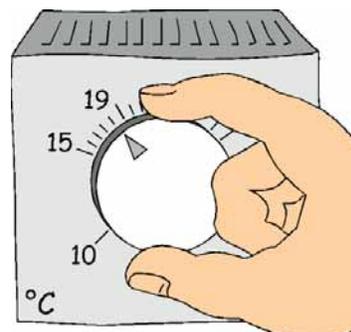


Lab: Ohmic Materials, Part Two

This week is a continuation of last week's activity.

There are some materials that conduct electricity so that the *current* that flows through it is *linearly proportional* to the applied *voltage*. Such a material is called “Ohmic”. If you know that a material is Ohmic, you can tell what the current is just by knowing how much voltage you are applying. Predictability is important for certain electrical hardware.



Question: Propose a “rule” that determines whether data is linear or not.

According to this rule, are either of your materials Ohmic?

For the class discussion, be prepared to state clearly what your standard for linearity is, and prove whether or not the resistor and the light bulb are Ohmic.

I. Introduction:

10 min

Whole class

There is no equipment this week; last week's data is all they get.

Lead a brief discussion on what happened last week. They may have made a qualitative judgment based on the data, but stress that it's okay to change their minds.

Emphasize that making a strong argument will require quantitative proof. All the Excel tools will be at their disposal. They should print out data or use whiteboards.

They should have the same roles as last week.

II. Brainstorming and Planning Meeting:

10 min

Groups of 4

Check in with them about how they are dealing with variation in the data, what their test for linearity is going to be, and what visual representation will best make their point, if any.

III. Carrying out the Experiment

40 min

Groups of 4

“What are you doing to avoid the kind of problems in the lab report(s) you evaluated last week?”

Have them use the first week's lab as a guide, esp the ‘Summary.’

Common problems: * Drawing a line through (or having Excel fit a line to) whatever their data is and saying that means it's linear. * Having no error bars on their I-V graph, which basically means there's no claim they can persuasively make. In fact there is likely to be variation in both V and I.

IV. Class Discussion

30 min

Whole Class

They make fast white-board presentations of their analysis and conclusions (5 min each).

V. Evaluate and Reconsider:

15 min

Groups of 4

They need to write up their data analysis and evaluation of data analysis (the latter should be informed by the class discussion). Then they turn in the whole report.