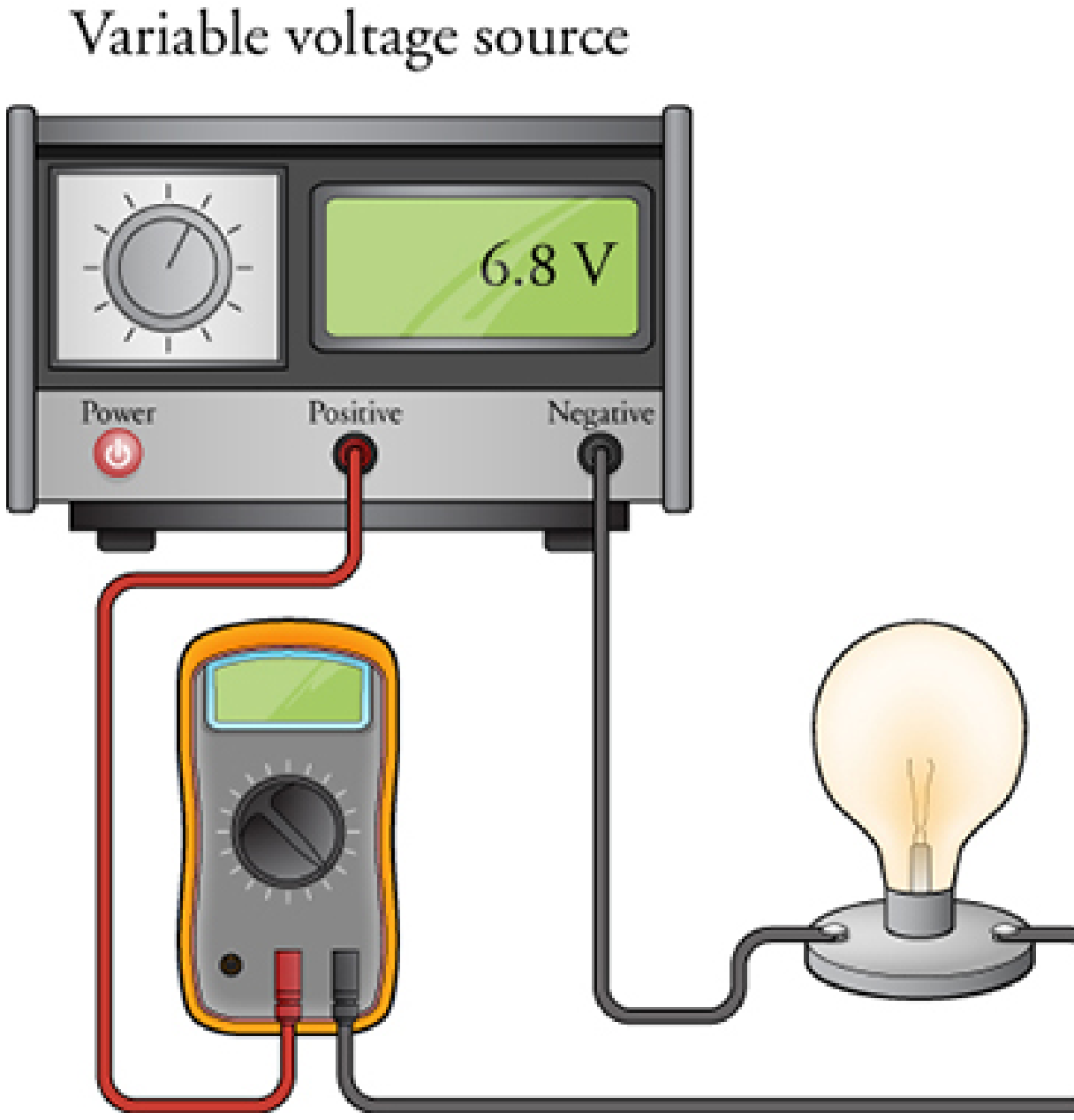
Performance Task

19.4 Electric Power 29.

1. An incandescent light bulb (i.e., an old-fashioned light bulb with a little wire in it)
2. A lightbulb socket to hold the light bulb
3. A variable voltage source
4. An ammeter

Procedure

- Screw the lightbulb into its socket. Connect the positive terminal of the voltage source to the input of the ammeter. Connect the output of the ammeter to one connection of the socket. Connect the other connection of the socket to the negative terminal of the voltage source. Ensure that the voltage source is set to supply DC voltage and that the ammeter is set to measure DC amperes. The desired circuit is shown below.



- On a piece of paper, make a two-column table with 10 rows. Label the left column *volts* and the right column *current*. Adjust the voltage source so that it supplies from between 1 and 10 volts DC. For each voltage, write the voltage in the volts column and the corresponding amperage measured by the ammeter in the current column. Make a plot of volts versus current, that is, a plot with volts on the vertical axis and current on the horizontal

axis. Use this data and the plot to answer the following questions:

1. What is the resistance of the lightbulb?
2. What is the range of possible error in your result for the resistance?
3. In a single word, how would you describe the curve formed by the data points?

Teacher Support

Teacher Support This performance task supports

- NGSS Practice 4 : Analyzing and interpreting data, and
- Standard 2K: Communicate valid conclusions supported by the data through various methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.

Once collected, data must be presented in a form that can reveal any patterns and relationships and that allows results to be communicated to others. Because raw data as such have little meaning, a major practice of scientists is to organize and interpret data through tabulating, graphing, or statistical analysis. Such analysis can bring out the meaning of data and their relevance so that they may be used as evidence.

Engineers, too, make decisions based on evidence that a given design will work; they rarely rely on trial and error. Engineers often analyze a design by creating a model or prototype and collecting extensive data on how it performs, including under extreme conditions. Analysis of this kind of data not only informs design decisions and enables the prediction or assessment of performance but also helps define or clarify problems, determine economic feasibility, evaluate alternatives, and investigate failures.

The curve should be linear and approximately go through the origin of the plot. The resistance of a 100-W, 120-V incandescent lightbulb should be around 144 Ω .