

19.3

Electrical Resistance and Ohm's Law



Question: How are voltage, current, and resistance related?

1

Resistance and current

- a Explain why the current changes when the dial of the potentiometer is turned. The dial controls the resistance of the potentiometer, which varies from 0Ω (ohms) to 105Ω .

- b Explain why the bulb is dim or bright depending on the position of the potentiometer. Your answer should use the concepts of resistance, energy and current.

2

The current and voltage relationship for a fixed resistor

Table I: Voltage vs. current

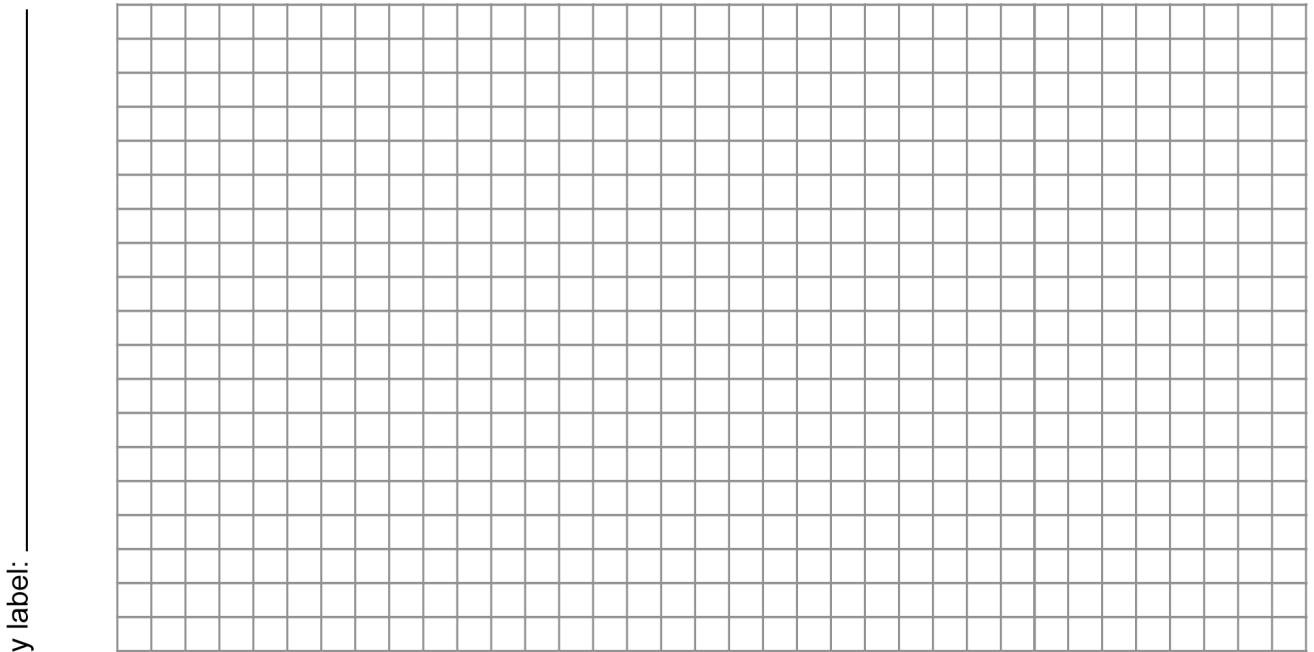
Potentiometer setting	Current (A)	Voltage (V)

3**Finding the relationship between voltage, current, and resistance**

- a. Examine the data in Table 1. Describe in words what happens to the voltage across the fixed resistor as the current decreases.

- b. Graph the data from Table 1. Put voltage on the y -axis and current on the x -axis. Label your x - and y -axes and title your graph.

Title: _____



- c. Draw a best-fit line that matches the trend of the points on your graph. Calculate the slope of the line.

- d. The resistance of the green fixed resistor is 5 ohms. How does this value compare with the slope of your graph?

- e. The equation that relates current, voltage, and resistance is called Ohm's law. Write the mathematical equation for Ohm's law using V for voltage, I for current, and R for resistance.

4**Voltage and current for a light bulb****Table 2: Voltage vs. current for a bulb**

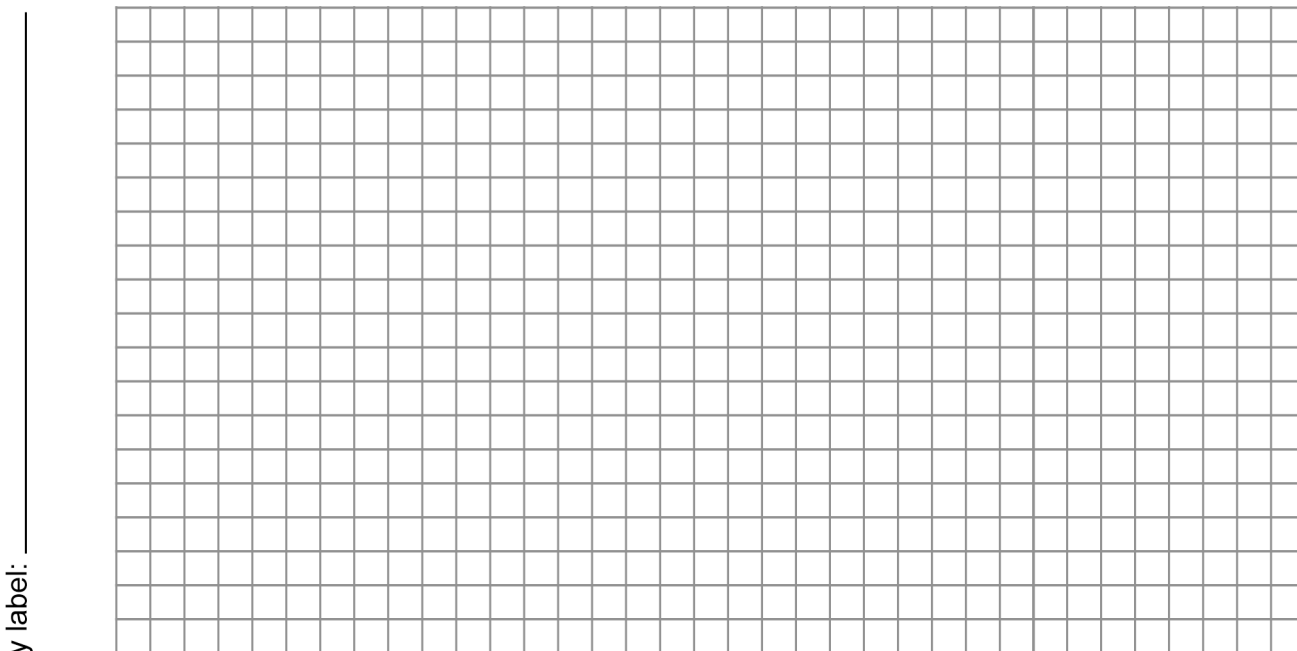
Potentiometer setting	Current (amps)	Voltage (volts)

5**Analyzing the bulb's current, voltage, and resistance**

a. What happened to the brightness of the bulb as you decreased the current?

b. Graph the data from Table 2. Put voltage on the y -axis and current on the x -axis. Label your x - and y -axes and title your graph.

Title: _____



x label: _____

c. Compare the shape of the graph for the light bulb to the shape of the graph for the fixed resistor.

d. Use Ohm's law to calculate the resistance of the light bulb for each pair of voltage and current values.

e. How is the resistance of the light bulb related to the amount of current through it?

f. Discuss a possible reason for the bulb's resistance changing.
