

PhyzLab: There's No Place Like

an investigation of resistance

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| PERIOD | 1. | | |
| | 2. | | |
| GROUP | 3. | | |
| | 4. | | |

• Pre-Lab Questions •

Electric current can pass through any body if enough potential is applied. The extent to which a body allows current to pass through it is called conductance. The extent to which a body resists current is called resistance. In this activity, you will investigate the factors that determine a body's resistance. In other words, what makes something resist more or resist less?

THE ORIGINAL WIRE

Consider a wire with length L and diameter d . It is made of a certain material, and has an absolute temperature T . It has a resistance R .

1. LENGTH

Consider a wire with twice the length ($2L$) and diameter d made of the same material and at an absolute temperature T . What is its resistance? Defend your answer.

2. DIAMETER

Consider a wire with the original length L and twice the diameter ($2d$) made of the same material and at an absolute temperature T . What is its resistance? Defend your answer.

3. MATERIAL

Consider a wire with length L and diameter d made of a different material and at an absolute temperature T . Would its resistance be different from that of the original's? Defend your answer.

4. TEMPERATURE

Consider a wire with the original length L and the original diameter d made of the same material and at an absolute temperature $2T$. What is its resistance? Defend your answer.

TechExperiment: There's No Place Like Ohm

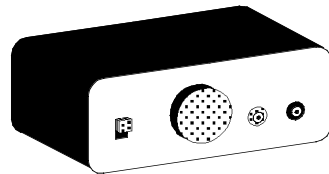
an investigation of resistance

• Purpose •

Electric current can pass through any body if enough potential is applied. The extent to which a body allows current to pass through it is called conductance. The extent to which a body resists current is called resistance. In this activity, you will investigate the factors that determine a body's resistance. In other words, what makes something resist more or resist less?

• Apparatus •

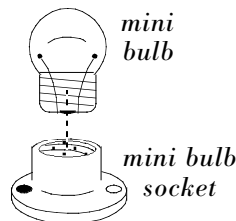
- ___ variable DC power supply
- ___ computer with data analysis software
- ___ current sensor
- ___ voltage sensor
- ___ interface device
- ___ connecting wires
- ___ resistance spools
- ___ minibulb in socket



DC power supply

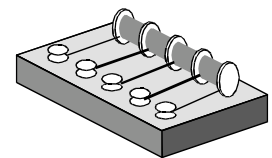


connecting wires



mini bulb

mini bulb socket



resistance spools

• Objectives •

1. LENGTH

- a. Identify two spools of wire having the same cross-sectional area but different lengths.
- b. Determine the resistance of each wire. Describe your procedure.
- c. Interpret the results. Print your annotated graphs.
- d. Repeat with different wires if possible to confirm or disconfirm.

2. CROSS-SECTIONAL AREA

- a. Identify two spools of wire having the same length but different cross-sectional areas.
- b. Determine the resistance of each wire. Describe your procedure.
- c. Interpret the results. Print your annotated graphs.
- d. Repeat with different wires if possible to confirm or disconfirm.

3. MATERIAL

- a. Identify two spools of wire having the same length and cross-sectional area made from different materials.
- b. Determine the resistance of each wire. Describe your procedure.
- c. Interpret the results. Print your annotated graphs.

2. TEMPERATURE

- a. Open your *Ohm, Ohm on the Digital Range* activity.
- b. Create a set of graphs plotting Resistance vs. Power for all known resistors and the minibulb.
- c. Interpret the graph.
 - i. What does it say about the ceramic power resistors?
 - ii. What does it say about the minibulb?