

Investigating I-V Graphs

Current, Voltage and Resistance for a Resistor, Lamp and Diode

Aim:

You are investigating how current varies with voltage for a fixed resistor, a filament lamp and a diode.



Prediction:

Which of the three components do you predict will give a straight-line I-V graph through the origin — the fixed resistor, the filament lamp, or the diode? Give a reason for your answer.

Test each component in the sim to check.

Method:

1. Select the Resistor using the Component selector.
2. Set the Power pack voltage slider to a voltage of your choice and read the ammeter and voltmeter.
3. Record the component, voltage and current in your results table.
4. Repeat for at least four more voltages for the resistor, spread across the full range from -6 V to +6 V, including both positive and negative values.
5. Repeat steps 1-4 for the Filament Lamp.
6. Repeat steps 1-4 for the Diode. Choose some voltages close together near 0 V as well as voltages near -6 V and +6 V, since the diode's behaviour changes sharply close to zero.

Results:

Component	Voltage (V)	Current (A)

Analysis:

Plot a graph of current (y-axis) against voltage (x-axis) for the resistor. What shape is the graph, and what does this tell you about how the resistor's resistance changes as the voltage changes?

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Plot the filament lamp's I-V graph on the same axes. How does its shape differ from the resistor's straight line, and what does this suggest is happening to the filament's resistance as the current increases?

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Plot the diode's I-V graph. What happens to the current when the voltage is negative, and at roughly what voltage does the diode start to conduct?

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Comparing all three graphs, which component obeys Ohm's law, and how can you tell just by looking at the shape of its graph?

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