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## Lesson Plans

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### Get Connected With Ohm's Law

[Download Full Lesson Plan](#)  
(Full teacher resource documents are included)

**Lesson Focus**  
Demonstrate Ohm's Law using digital multi-meters. Fun hands-on activities are presented that demonstrate Ohm's Law. Teachers use digital multi-meters to collect data that are plotted to show that voltage and current are related by linear functions for ordinary resistors and by power functions for light bulbs.



**Lesson Synopsis**

Fun hands-on activities are presented that demonstrate Ohm's Law ( $E = I \times R$ ). Teachers use digital multi-meters to collect data that are plotted to show that voltage and current are related by linear functions for ordinary resistors and by power functions for light bulbs.

**Age Levels:** 10-18

**Objectives**  
Learn about Ohm's Law. Be able to use a digital multi-meter to collect data. Explore the concepts of voltage and current.

**Anticipated Learner Outcomes**

As a result of the activities, students should develop an understanding of:

- Ohm's Law
- Relationship between Voltage, Current, and Resistance in an electrical circuit
- Measurement, plotting data, and graphing
- Basic wiring and construction of a digital multi-meter for data collection

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## Introduction: Ohm's Law: Introduction

What is Ohm's Law? Ohm's Law is a mathematical equation explaining the relationship between Voltage, Current, and Resistance within electrical circuits. It is defined as follows:

$$E = I \times R$$

- **E = Voltage** (Voltage is an electric potential difference between two points on a conducting wire. Voltage is measured in volts and comes from various sources such as electric outlets and batteries.)
- **I = Current** (Current is measured in amps. Current is charged particles which flow from the voltage source through conductive material to a ground.)
- **R = Resistance** (Resistance is the opposition that a material body offers to the passage of an electric current. Resistance is measured in ohms. Examples of items with resistance are light bulbs and coffeemakers.)

## Lesson Activities

The activity consists of using a nominal six-volt battery (made up of four nominal 1.5 volt dry cells connected in series) to:

- Drive current through a simple circuit element and measure and record the current through the element and the voltage across the element as the number of cells in the battery is varied from a single cell to four cells.
- Plot points on the graph that represent the voltages and currents recorded.
- Draw a "best fit" curve through the data points for the element tested.
- Repeat the process for two or three different resistor circuit elements.
- Compare the curves and make observations about the nature of the curves for each element.

Six teacher handouts are provided:

- Ohm's Law Information Sheet
- Step By Step Lesson Plan Guidelines
- Appendix 1: Materials Sourcing Suggestions
- Appendix 2: Continuity Tester Assembly Instructions
- Appendix 3: Alternate Single Cell Battery Holder Photos and Diagrams
- Appendix 4: Optional Insulators and Conductors Activity

Two student handouts are provided for advance review:

- Ohm's Law Information Sheet

- Step By Step Procedures

### **Resources/Materials**

See attached student worksheets and teacher resource documents.

### **Alignment to Curriculum Frameworks**

Curriculum alignment sheet is included in [PDE](#).

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