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# BATTERY SAFETY: RESISTANCE AND OHMS LAW

***Written by Lucy Ikpesu***

## CLASS DESCRIPTION:

In this class, students will explore how Ohm's Law (V=IR) can be in our everyday life. Students will also understand the direct proportionality between current and resistance.

**TOTAL CLASS TIME**: 50 minutes.

## CLASS OUTCOMES:

- Students will understand the basic concept of Ohm's Law.
- Students will learn about how resistors work.
- Students will learn about battery safety.

## INTRODUCTION

In a simple circuit, when the battery supplies voltage (V), there is a flow of current (I) through the circuit that is proportional to the amount of voltage that supplied. This relationship is best explained by Ohm's law: V=IR. To simply explain this proportionality using the equation, if the current (I) is increased when resistance (R) remains constant, voltage (V) will also increase. In the same way, if the voltage (V) is increased when resistance (R) remains constant, current (I) increases.

## MATERIALS:

1. Two pieces of coated electrical insulated wire (one red and one black)

2. 9 Volts Battery

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3. Small light / LED bulb

4. Resistor

5. Bulb holder (optional)

6. Battery holder (optional)

## PRE-CLASS PREPARATION

Lay out all materials in a neutral place where all students will be able to access them. Pair the class in groups of 2s. There will be two parts in this activity.

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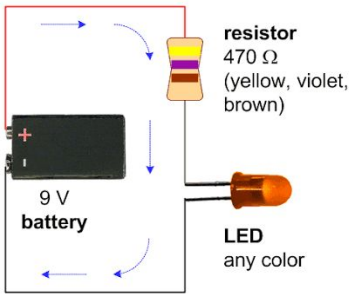
## PROCEDURES

**Part 1: Create a simple closed circuit with a resistor**

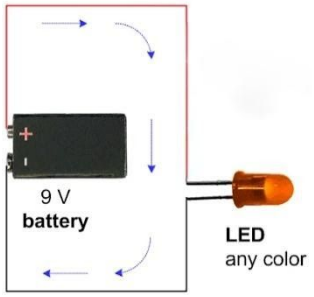
I. Connect one end of the red wire to the positive end of the battery
II. Then, connect the other end of the red wire to one end of the resistor and the other end of the resistor to one end of the LED bulb (use the diagram below as an example)
III. Connect one end of the black wire to the LED bulb
IV. Connect the other end of the black wire to the negative end of the battery.




*A Circuit with a Resistor*

**Part 2: Create a simple closed circuit without a resistor**

I. Connect one end of the red wire to the positive end of the battery
II. Then, connect the other end of the red wire to the LED bulb (use the diagram below as an example)
III. Connect one end of the black wire to the LED bulb
IV. Connect the other end of the black wire to the negative end of the battery.




*A Circuit without a Resistor*

## DISCUSSION/OBSERVATION

Discuss extensively what happens when a resistor is used in the circuit and when one is not used. Student should state their observations and pay attention to the brightness and temperature of the bulb in each circuit.

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## EXPLANATION

In the first part of the procedure, we had a resistor in our circuit and the job of the resistor is to reduce the voltage being delivered to the LED bulb. In this circuit there isn't much voltage being delivered to the LED bulb due to the resistor so the current also isn't much. In the second circuit however, the voltage being delivered to the LED bulb is more because there is no resistor, so the current is also more. This explains why the LED bulb in the circuit without a resistor is brighter. Resistors are very important in preventing overflow of voltage and electricity. Without them, our led bulb will heat up (like the LED bulb in the second part of the procedure) and could eventually burn. Many house hold appliances also have resistors to prevent them from randomly overheating and exploding.