

Main Ideas, Key Points, Questions:

After watching the video segment, write down key points, main ideas, and big questions.

Objective(s):

- *Define Ohm's law mathematically and in words.*
- *Understand how different materials may or may not follow Ohm's law.*

Notes:

During the video segment, use words, phrases, or drawings to take notes.

Summary:

After watching the video segment, write at least three sentences explaining what you learned. You may ask yourself: "If I was going to explain this to someone else, what would I say?"

Answer the following.

1. Define voltage, current, and resistance.

Voltage is the difference in electric potential between two points.

Current is the flow of charge in response to an electric field created by a difference in electric potential.

Resistance is opposition to the flow of charge created by collisions

with physical objects that are in the path of the moving charges.

Voltage is the pressure behind the flow, resistance is the opposition to the flow, and current is the result!

2. Name two ways that knowing Ohm's law could be helpful for someone designing an electrical circuit.

Knowing Ohm's law would be useful for:

Showing how changes in resistance affect current levels of a circuit.

Determining how voltage drops across certain resistors.

Solving for the missing value when given two of three among voltage, current, and resistance.

Other responses may be acceptable according to the teacher's judgement.

3. When current flows through a wire of length L and cross-sectional area A , the resistance in the wire is:
(Choose one.)



- a. proportional to L and A
- b. inversely proportional to L and A
- c. **proportional to L and inversely proportional to A**
- d. inversely proportional to L and proportional to A

Answer the following.

4. Using a material that is "Ohmic" (follows Ohm's law), you make a circuit using wire, a battery, and a resistor. After measuring V , I , and R across the circuit, you switch out the original resistor with one that is three times more resistive. When you measure V , I , and R again, how will the new values compare to the original measurements?

Based on Ohm's law ($V = IR$), voltage remains the same,

current is reduced by three times, and resistance triples.

$$V = I \times R$$

$$V = \frac{I}{3} \times 3R$$

5. You are given two materials, A and B, and told that one follows Ohm's law while the other does not.

An Ohmic material obeys Ohm's law, which states that for a fixed resistance, there is a linear relationship

between V and I . To test if a material is Ohmic, buy a four-pack of AA batteries (each providing 1.5 V)

and start with one battery supplying the voltage across a simple wire circuit with one resistor.

Next, put an ammeter (to measure the current) in the circuit and complete a table like the one below:

Voltage	Current
1.5 V	
3.0 V	
4.5 V	
6.0 V	

If the current doubles, triples, and quadruples according to the voltage, the material is Ohmic.

If there is some other relationship between voltage and current, the material does not follow Ohm's law.

Answer the following.

6. Write three different but equivalent ways of expressing Ohm's law mathematically.

$$V = IR$$

$$I = \frac{V}{R}$$

$$R = \frac{V}{I}$$

7. If doubling the voltage across an Ohmic resistor also doubles the current in the resistor, which of the following is true? (Choose one.)
- a. The resistor value decreases.
 - b. The resistor value increases.
 - c. ***The resistor value stays the same.***
 - d. The change in resistor value can't be determined.