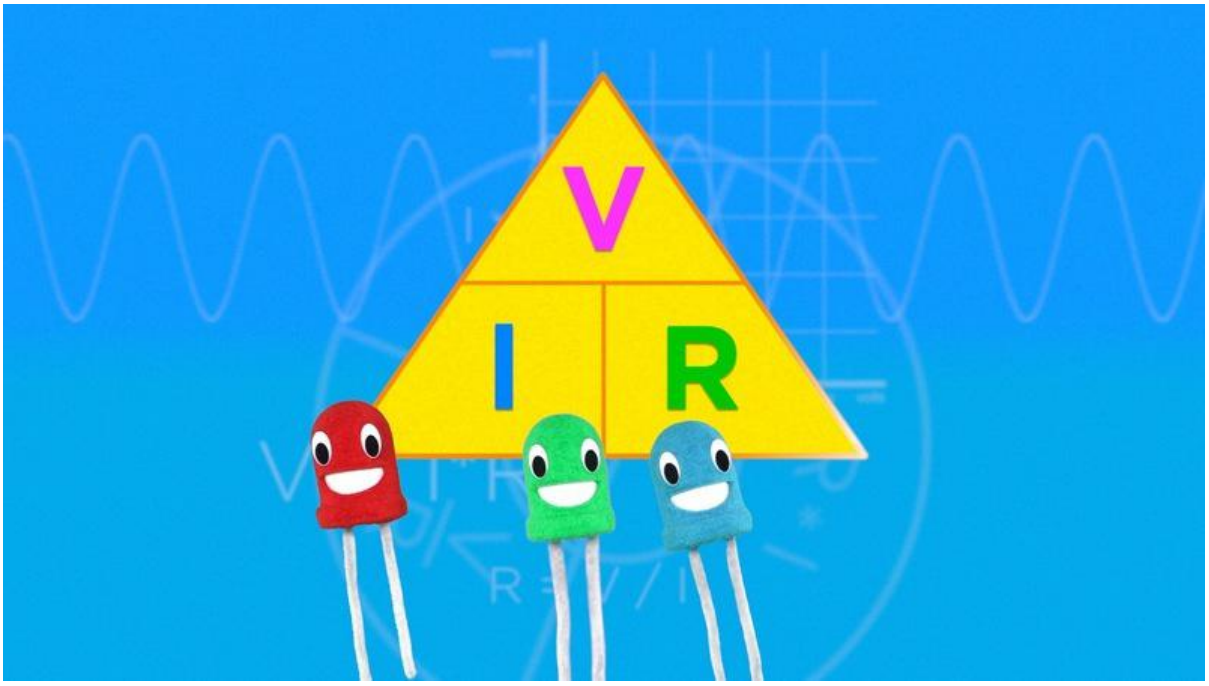
Circuit Playground - O is for Ohm

Created by Collin Cunningham



https://learn.adafruit.com/circuit-playground-o-is-for-ohm

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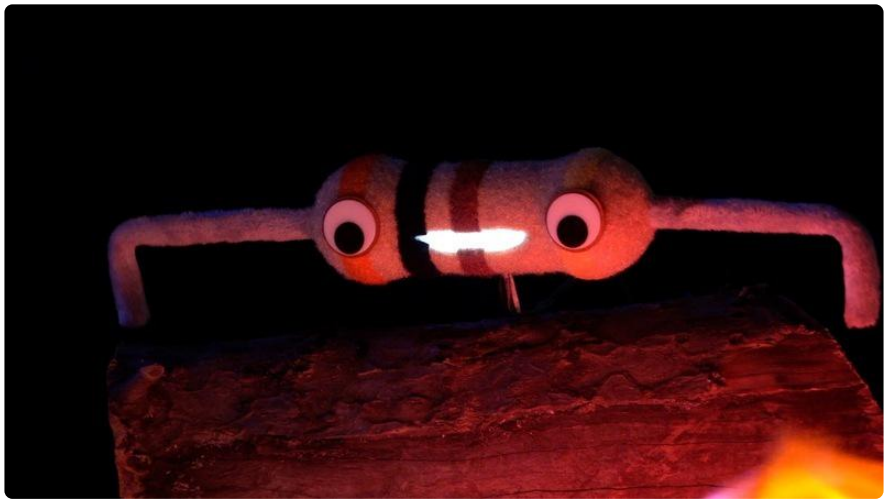
Video

It’s the Circuit Playground campfire musical! Adabot, Mho, and Minerva learn all about a foundation of electrical engineering - Ohm’s Law.

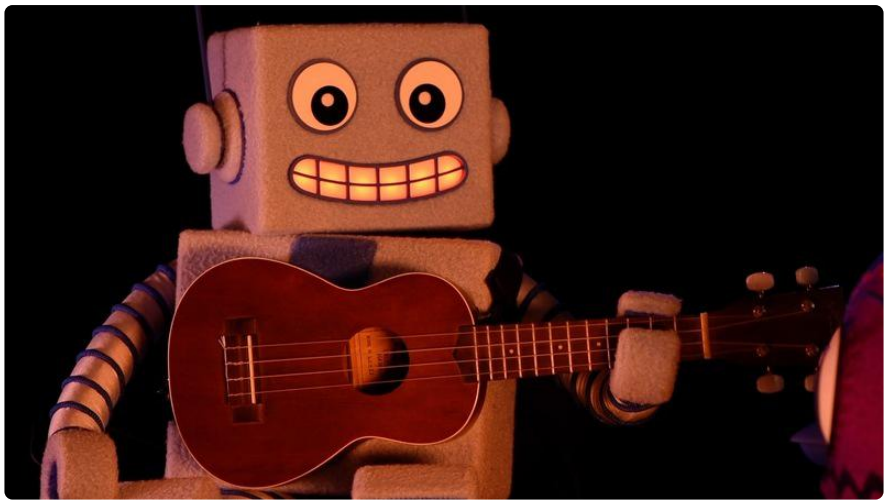
Transcript



Mho: ... and some say you can still here the blue smoke monster howling in the night!

Adabot: Ooh - spooky story!

Minerva: Very spooky Mho. Thank you for sharing it.



Adabot: Hey - how ‘bout we lighten the mood a little bit with some music. I brought my guitar here.

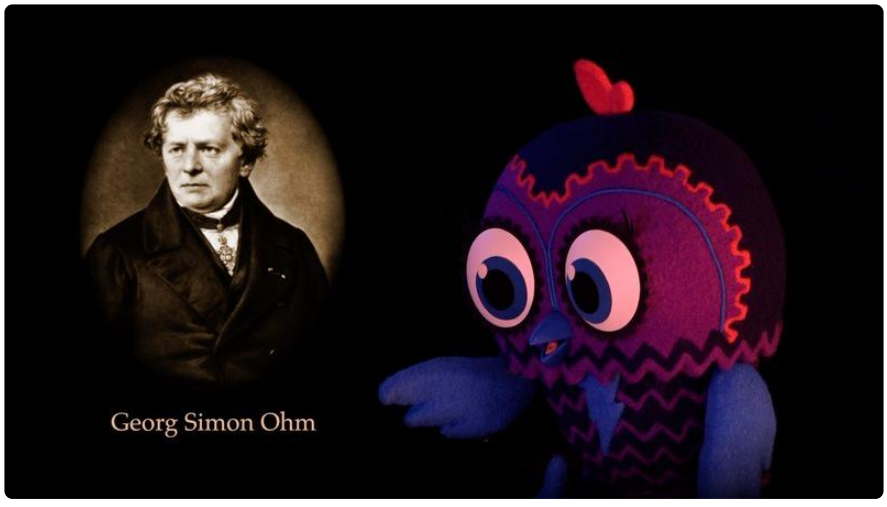
Minerva: I’ve been working on a little song. Have either of you heard of the scientist, Georg Simon Ohm?

Mho: I haven’t

Adabot: No

Minerva: Fantastic! Adabot - throw me a G chord please.

Adabot: Will do!



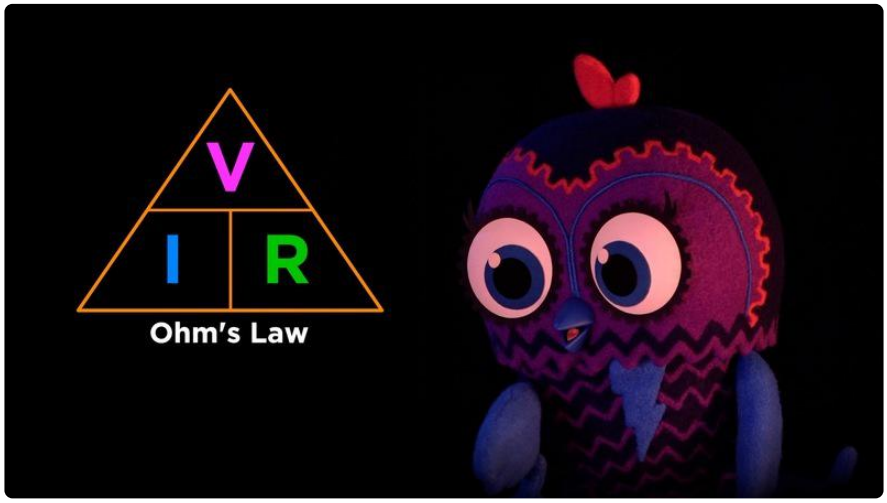
Minerva: You see, Georg Simon Ohm was experimenting.

And he happened upon something very interesting.

He found that volts and current are related to each other.

But it's not like they're cousins, or sisters, or brothers.

It's a rule, that we now call, Ohm's Law

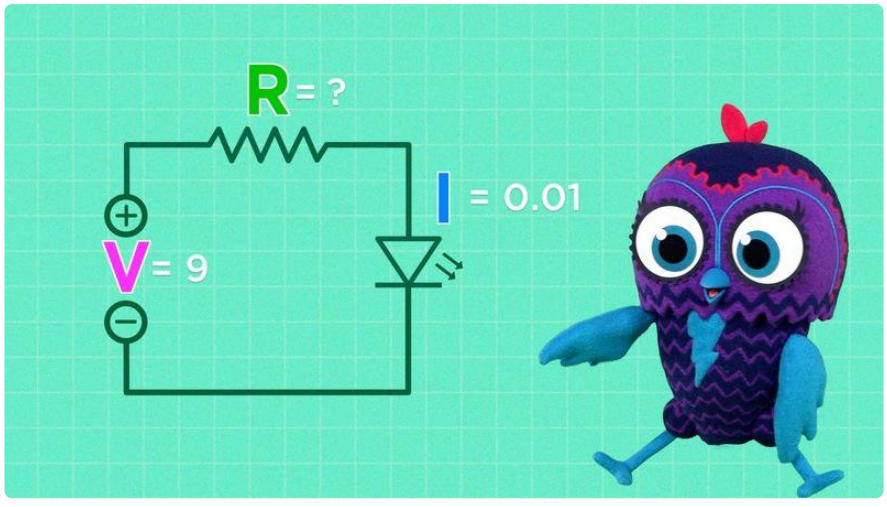


You can't break ohm's law

Because it's always true

To find one value

You only need the other two



Say you're working in a circuit and you need a certain current.

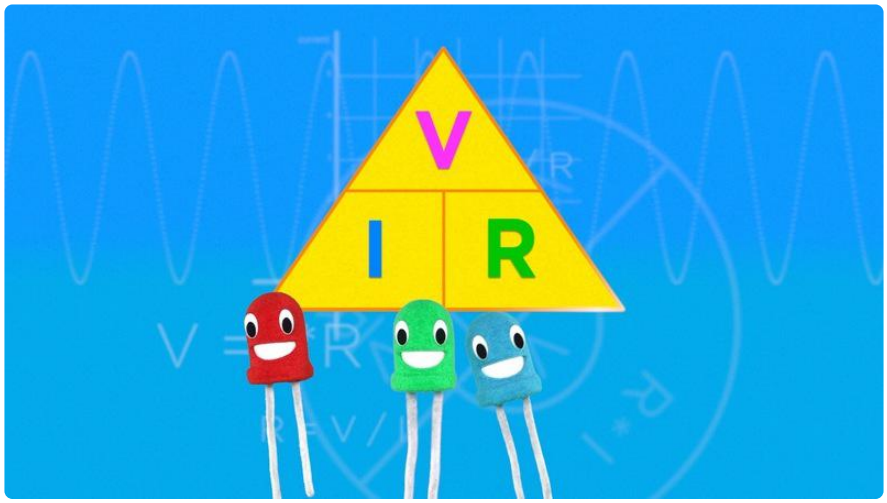
10 milliamps from a 9V supply

How many ohms will give you those amps?

You don't have to guess or take any chances

Just apply, and rely on

On Ohm's Law



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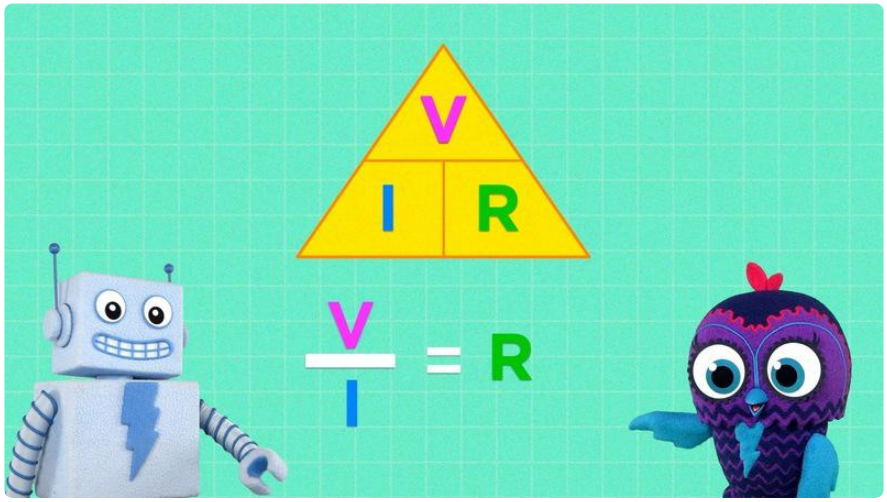
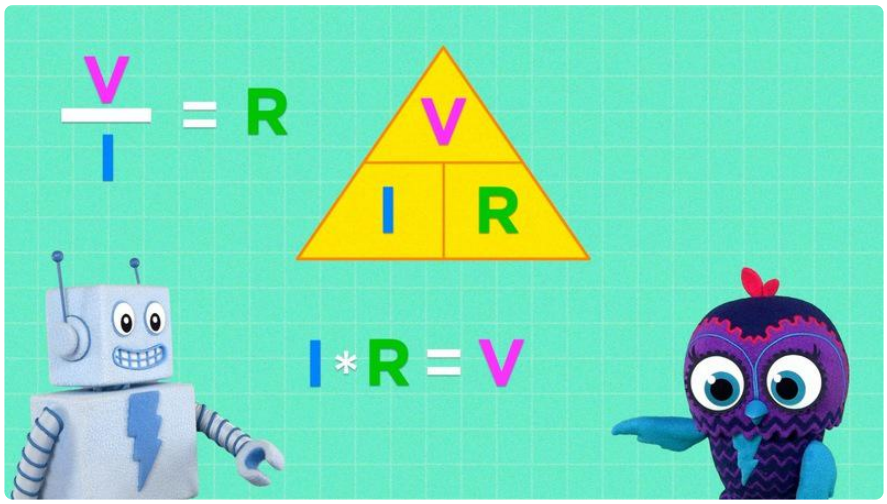
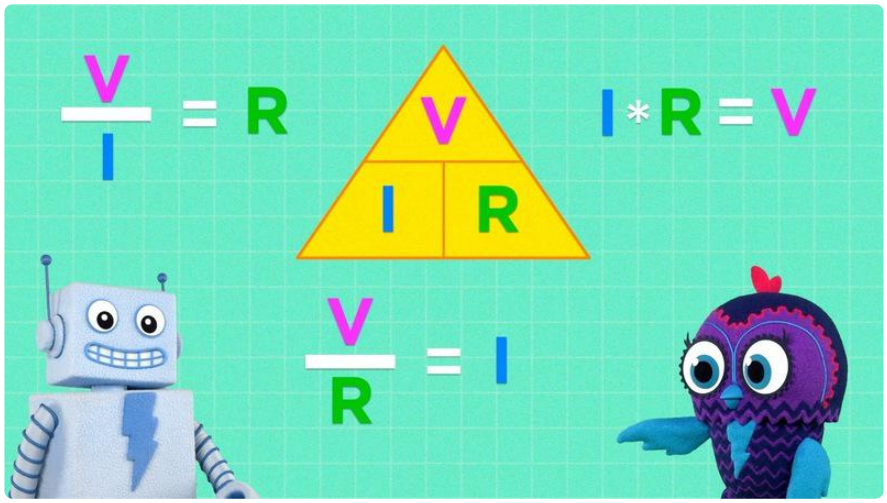


Divide voltage by current ... to find the resistance!

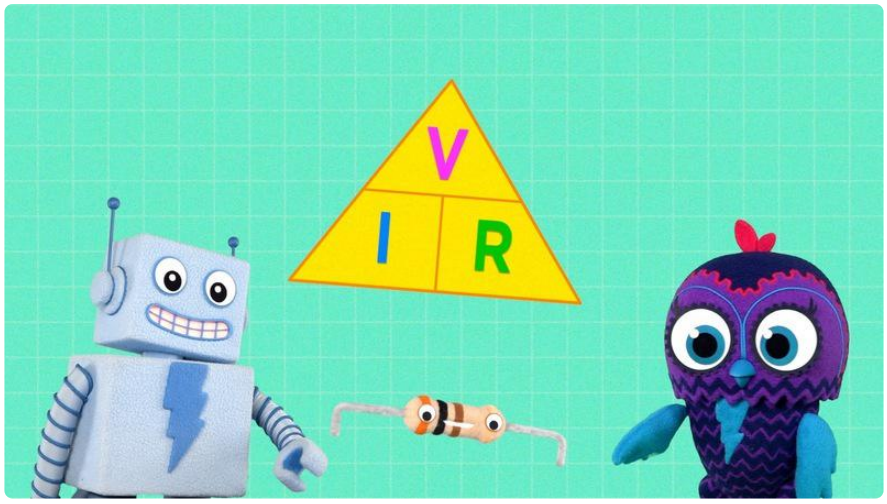


Resistance times current ... will tell you the volts!



Divide voltage by resistance ... to find the current!

And that's all, that we call - Ohm's Law



Adabot: So, you really can't break Ohm's Law?

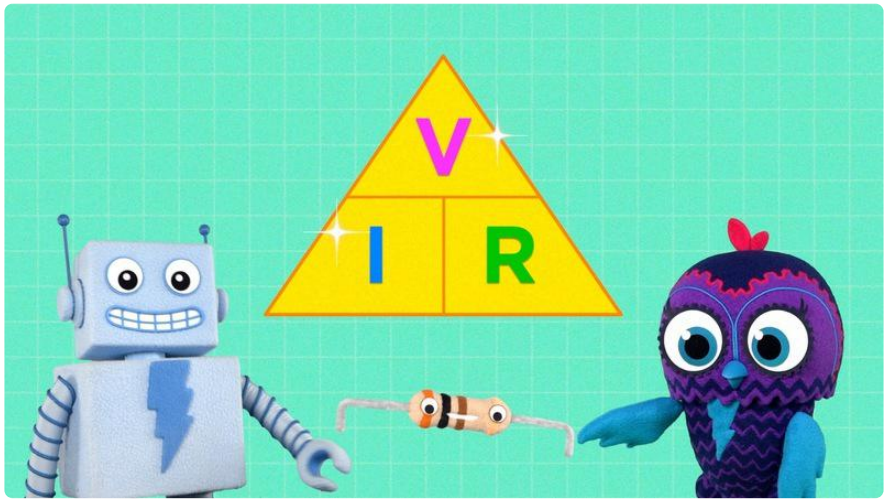
Minerva: No, you can't

Adabot: Like, not even sometimes?

Minerva: It is always true

Adabot: and to find one of the values, I just need the other two.

Minerva: You've got it!



You can't break ohm's law

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To find one value

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Adabot: Oh yeah!

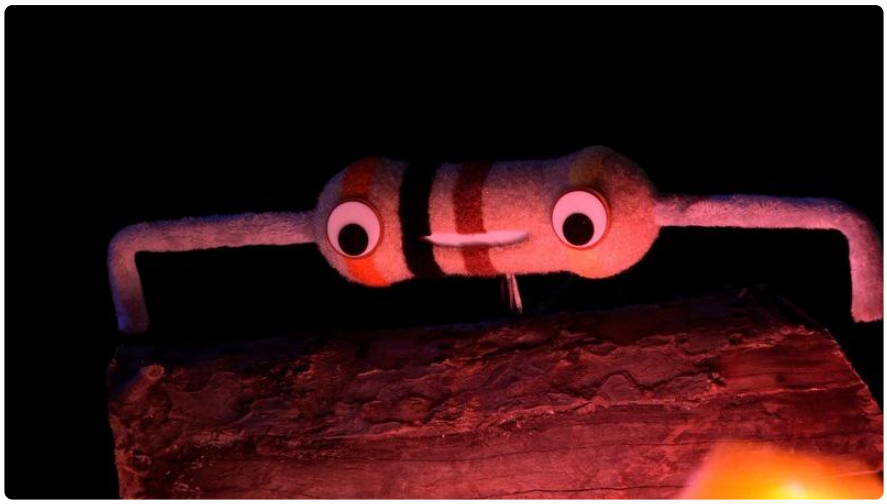
Minerva: Bravo!

Mho: So good!

Adabot: Hey - did you guys hear something?

[Distant howling]

Mho: Uh-ohh ...



Learn More

Ohm's Law definition ():

> Ohm's law states that the current through a conductor between two points is directly proportional to the voltage across the two points

Ohm's Law is an important rule in electrical engineering that's also easy to learn an apply. It describes how electrical current is related to voltage and resistance:

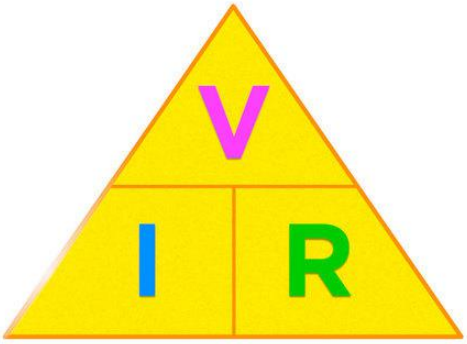
$$I = V/R$$

Ohm's Law's basic equation can be rearranged to find any of the three values:

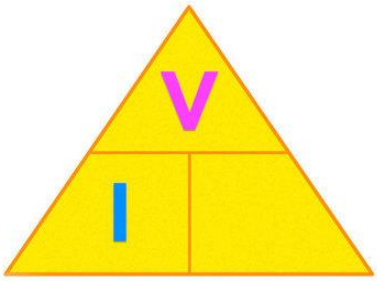
$$R = V/I$$

$$V = I*R$$

The easiest way to remember this relationship between voltage, current, & resistance is by arranging them in a triangle, like this:

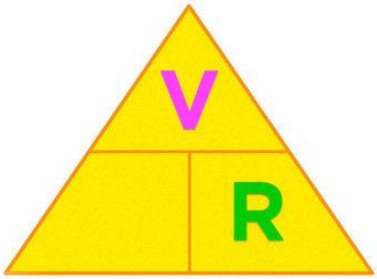


When you want to find one value, cover it up and look at the remaining values - they will show you what operation to perform. For example, when we omit R, we see V over I ...

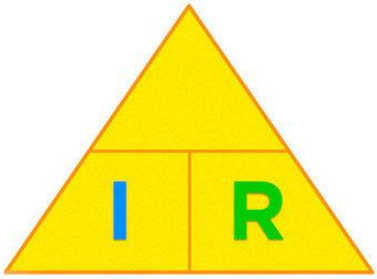


$$R = \frac{V}{I}$$

And we can repeat this process for the remaining values with the following results ...



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



$$V = I*R$$

One of the most practical applications of Ohm's Law is using it to find the amount of r esistance we'll need in order to pass a specific amount of current from a specific

amount of voltage. This is handy when you want to provide the correct amount of curr ent to an LED.

A little history

from Wikipedia ():

> Ohm's law was probably the most important of the early quantitative descriptions of the physics of electricity. We consider it almost obvious today. When Ohm first published his work (1827), this was not the case; critics reacted to his treatment of the subject with hostility. They called his work a "web of naked fancies" and the German Minister of Education proclaimed that "a professor who preached such heresies was unworthy to teach science." The prevailing scientific philosophy in Germany at the time asserted that experiments need not be performed to develop an understanding of nature because nature is so well ordered, and that scientific truths may be deduced through reasoning alone. Also, Ohm's brother Martin, a mathematician, was battling the German educational system. These factors hindered the acceptance of Ohm's work, and his work did not become widely accepted until the 1840s. However, Ohm received recognition for his contributions to science well before he died.

Links

- Physics for Kids - Ohm's Law ()
- What is Ohm's Law - Science for Kids ()
- Ohm's Law Lesson for Kids: Definition & History ()
- Ohm's Law - Wikipedia ()