



Erasmus+



Ohm's Law [3rd grade of Gymnasium - 2 teaching hours]

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CLIL LESSON PLAN: PHYSICS

Aims:

The students will:

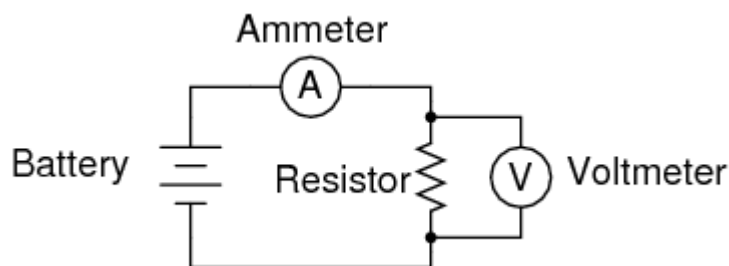
- Use school lab's equipment to create a simple circuit and get measurements.
- Derive to the Ohm's Law as result of those measurements.
- Detect if every device obey this Law.
- Solve selected problems using Ohm's Law.

Previous knowledge:

Electric Current (DC), Amperage, Voltage, Resistance of a resistor

Strategies – Steps:

1. Create a circuit with one resistor (with constant resistance), wires, one switch and 4x1.5 Volt batteries (to get different values of the applied voltage) and use two multimeters to measure the corresponding values of voltage and amperage of the electric current.



2. Use different values for the applied voltage and get measurements for the voltage and the corresponding amperage of the electric current applied to the resistor. Fill in a table of those measurements and then create the voltage-amperage plot (V-I graph) to determine the relationship between those quantities (for constant value of the resistance).
3. Repeat steps 1 and 2 using another resistor with different value of resistance.
4. Derive/conclude to the mathematical formula that describes the relationship between amperage I, voltage V and the resistance R:

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

where **amperage I** is measured in **Amperes**, **voltage V** is measured in **Volts** and **resistance R** is measured in **Ohms**.

Generally: Ohm's law defines a linear relationship between the voltage and the current in an electrical circuit, that is determined by the resistance.

5. Replace the resistor with a small lamp and do the same steps (creation of the circuit, measurements and plot: V-I graph) to show that it doesn't obey Ohm's Law.

Ask the question: "Why it doesn't obey the Ohm's Law?" and discuss the possible reason.

6. Solve simple problems using Ohm's Law

References

1. "Physics -3rd grade of Gymnasium" (Nikolaou A., Dimitriadis P., Kampouris K., Papamixalis K., Papatsima L.) [The formal book for Physics chosen by the Greek Education Ministry]

and the corresponding "Guide for laboratory Experiments"

<http://ebooks.edu.gr/new/classcoursespdf.php?classcode=DSGYM-C>

2. <http://mypages.iit.edu/~smile/>

Vocabulary

Laboratory (Lab)

Equipment

Circuit

Measurement

Law

Device

Electric Current

Amperage

Voltage

Resistance

Resistor

Constant

Wire

Switch

Multimeter

Plot

Graph

Value

Mathematical Formula

Linear relationship

Lamp