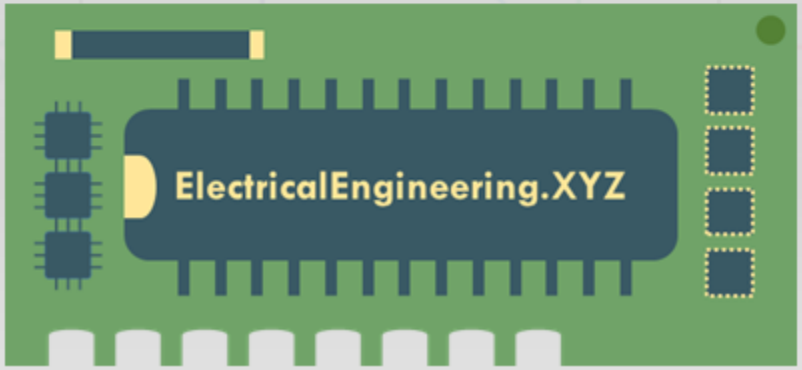
Ohm's Law Electrical Engineering XYZ Slides

The electric current flowing through a pure resistor is directly proportional to the applied voltage

Ohm's Law



Ohm's Law

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In this ElectricalEngineering.XYZ Lecture You'll learn

- History of Ohm's Law
- Statement of Ohm's Law
- Circuit diagram of Ohm's Law
- Formula of Ohm's Law
- Ohm's law in series circuits
- Ohm's law in parallel circuits
- Ohm's law graphical representation

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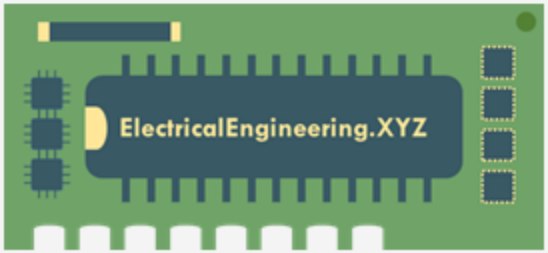
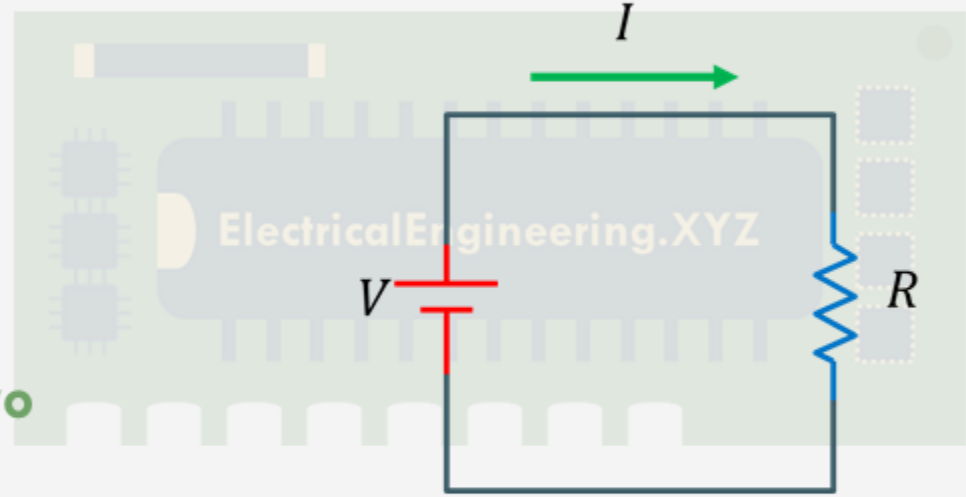
History of Ohm's Law

- Georg Simon Ohm was a German who began his research as a school teacher
- Using his own created equipment, he founded the direct proportionality relationship between the potential difference (voltage) applied across a conductor and the resultant electric current. This relationship is known as Ohm's law

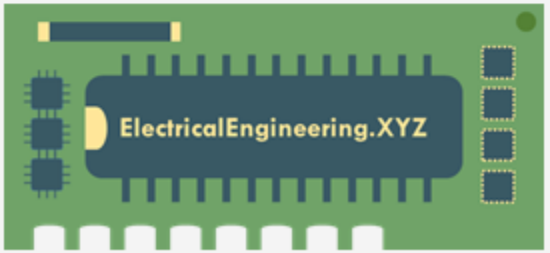


Statement

Ohm's law states that the electric current passing through a conductor is directly proportional to the potential difference (voltage) across the two points

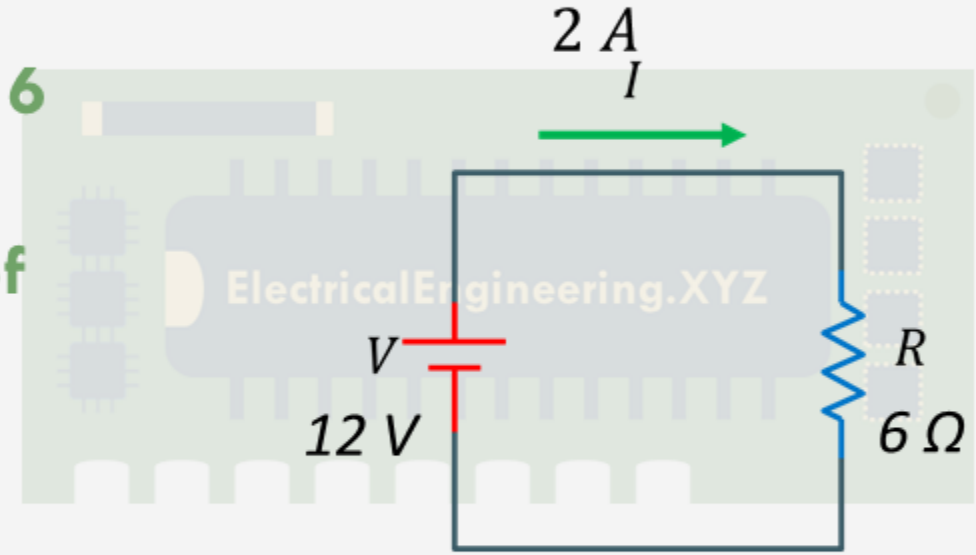


$$V = IR$$



An Example

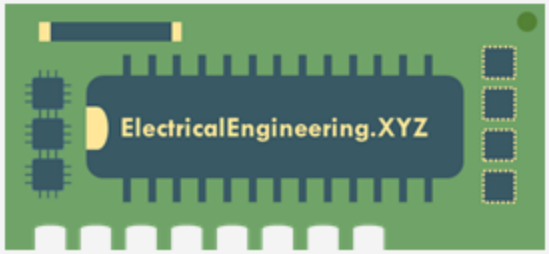
The 12 V source connected across a 6 ohms resistor will produce a current of 2 A in the circuit



$$V = IR$$

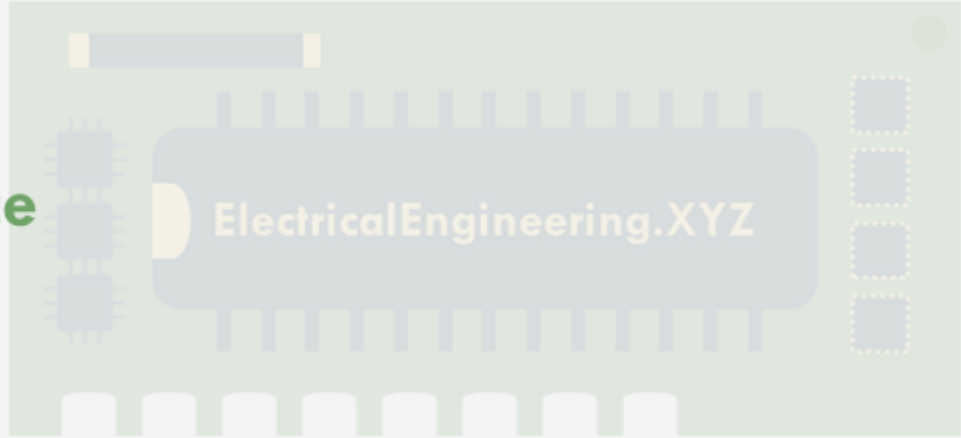
12 V = 2 A * 6Ω

12 V = 12 V

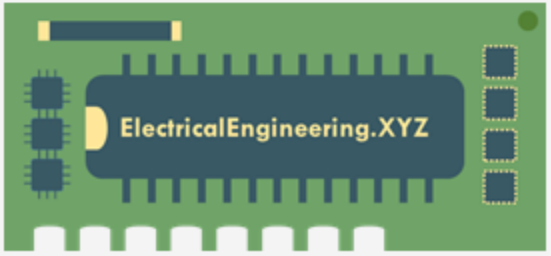


Ohm's Law and Circuit Analysis

- Ohm's law can be used to determine either current, voltage or resistance provided that other two quantities are known

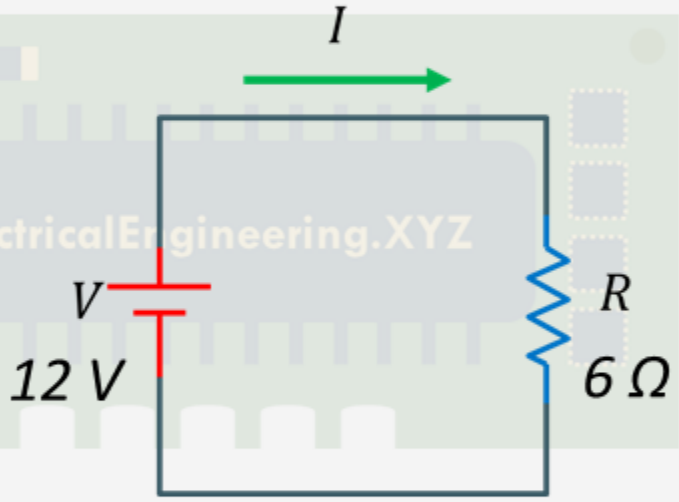


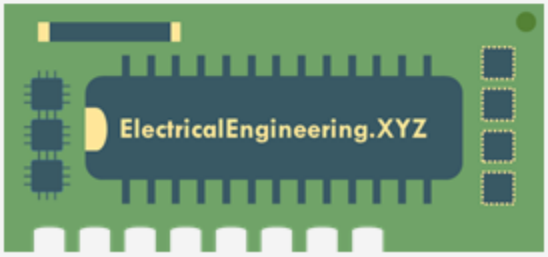
Circuit Analysis



Ohm's Law and Circuit Analysis

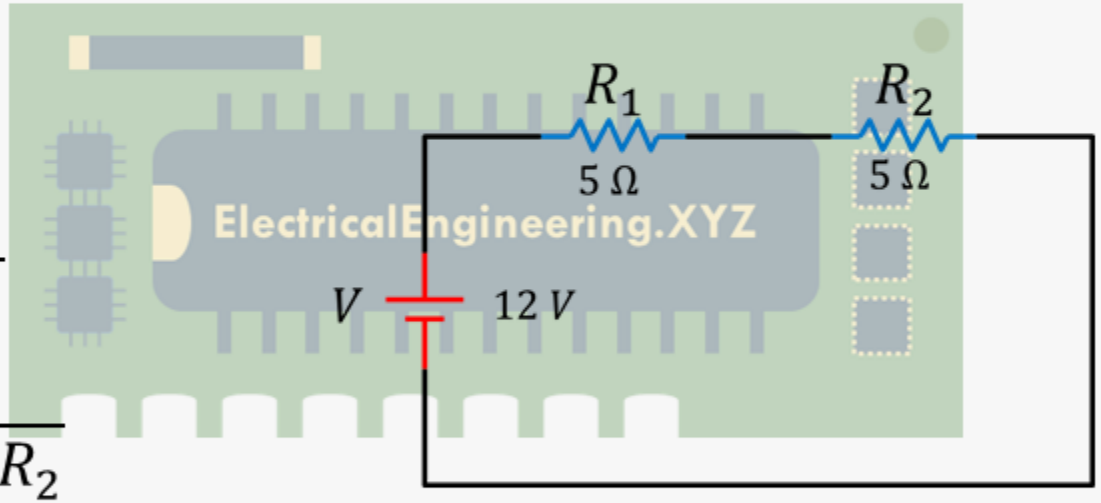
- Let's reconsider the circuit provided earlier
- Here we have a 6 ohms resistor at our disposal, If we want to calculate the current flow due to 12 V source. We can use Ohm's Law for that
- $I = \frac{V}{R} = \frac{12\ V}{6\ \Omega} = 2A$





Ohm's law for Series Circuits

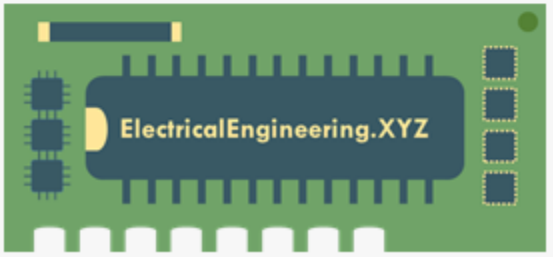
Calculate the amount of current flowing through two series resistors of 5 ohms each connected to a 12 V source.



$$I = \frac{V}{R_{eq}}$$

$$= \frac{V}{R_1 + R_2}$$

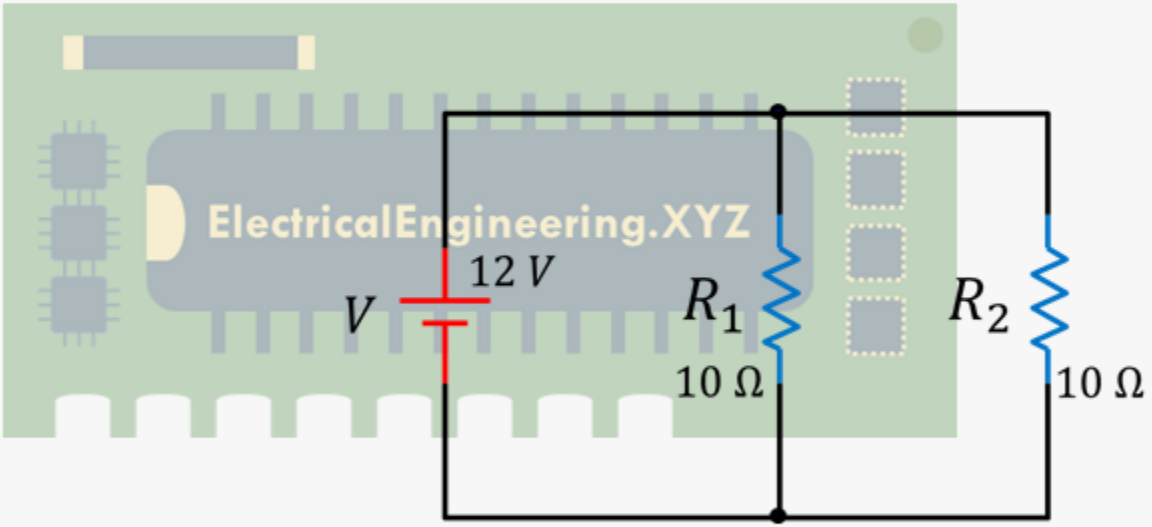
$$= \frac{12\ V}{5\ \Omega + 5\ \Omega} = \frac{12\ V}{10\ \Omega} = 1.2\ A$$



Ohm's law for Parallel Circuits

Calculate the amount of current flowing through two series resistors of 5 ohms each connected to a 12 V source.

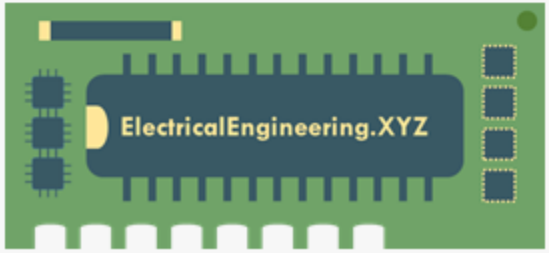
$$R_{eq} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2}} = 5\ \Omega$$

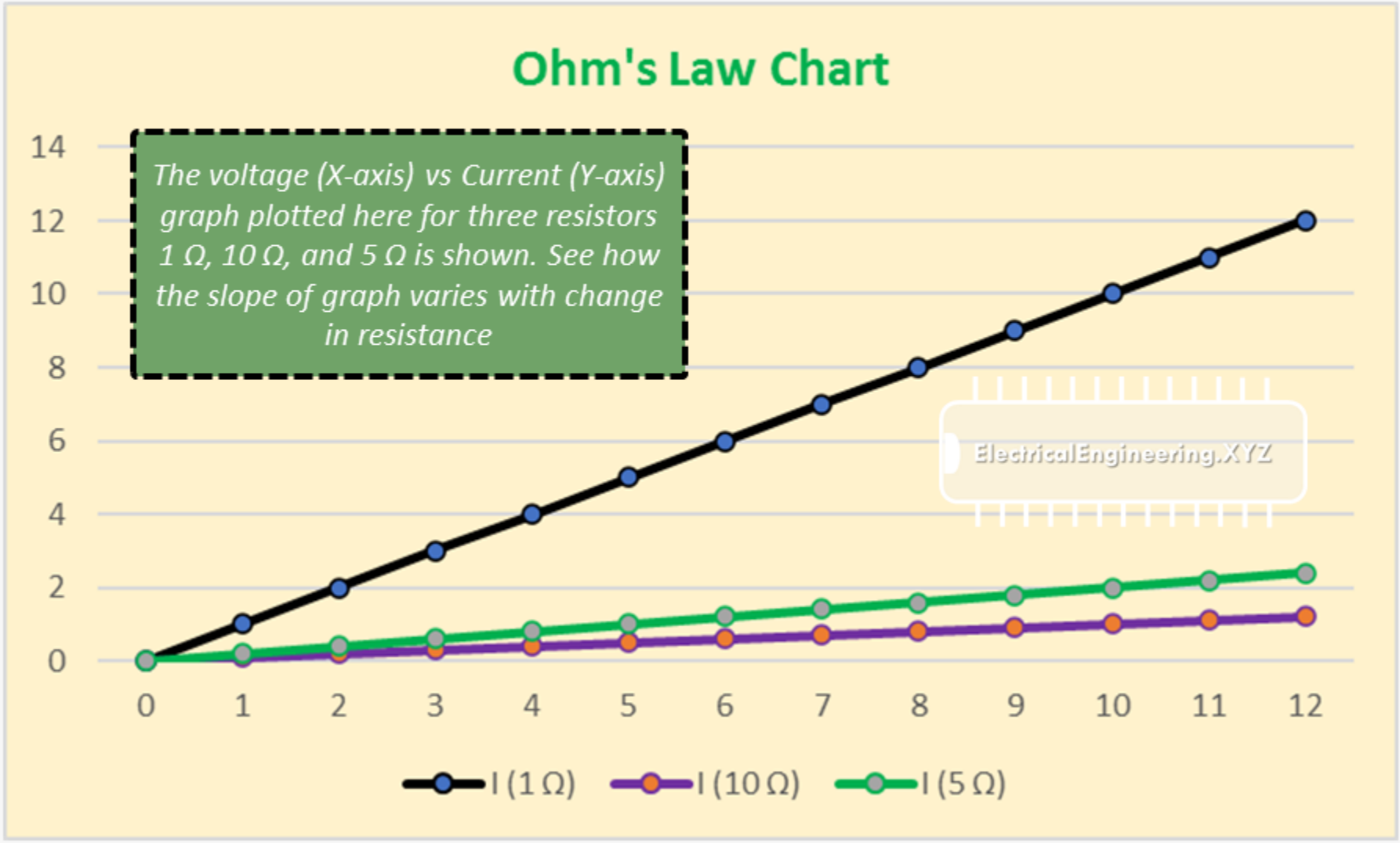


$$I = \frac{V}{R_{eq}}$$

$$= \frac{12}{5\ \Omega}$$

$$= 2.4\ A$$




Ohm's Law Chart
The voltage (X-axis) vs Current (Y-axis) graph plotted here for three resistors 1 Ω, 10 Ω, and 5 Ω is shown. See how the slope of graph varies with change in resistance
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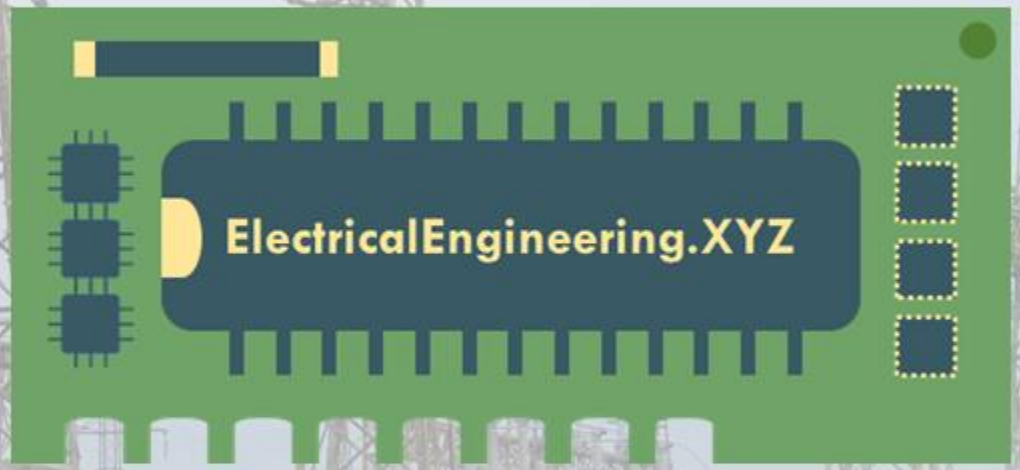
14
12
10
8
6
4
2
0
0 1 2 3 4 5 6 7 8 9 10 11 12
I (1 Ω)
I (10 Ω)
I (5 Ω)



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