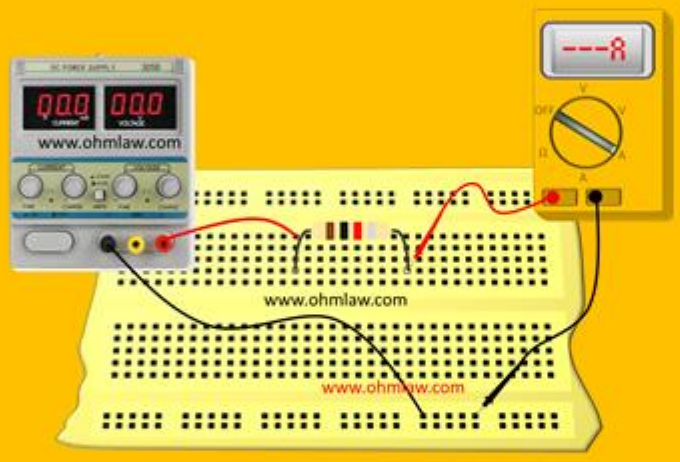
Ohm's law formulas		To Calculate			
		Voltage (V)	Current (I)	Resistance (R)	Power (P)
Given parameters	Current & Resistance	$V = IR$	---	---	$P = I^2R$
	Current & Power	$V = \frac{P}{I}$	---	$R = \frac{P}{I^2}$	---
	Voltage & Current	---	---	$R = \frac{V}{I}$	$P = VI$
	Voltage & Resistance	---	$I = \frac{V}{R}$	---	$P = \frac{V^2}{R}$
	Voltage & Power	---	$I = \frac{P}{V}$	$R = \frac{V^2}{P}$	---
	Power & Resistance	$V = \sqrt{P.R}$	$I = \sqrt{P/R}$	---	---



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EEE

Ohm's law

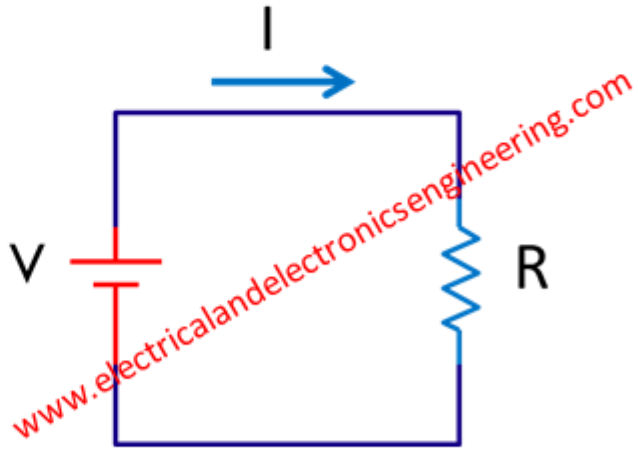
Ohm's law

A fundamental law of Electrical and Electronics Engineering which explains the relationship between current and voltage in circuits

Statement:
For a constant resistance the electrical current flowing through any resistor is directly proportional to voltage applied across it. Mathematically, $V \propto I$

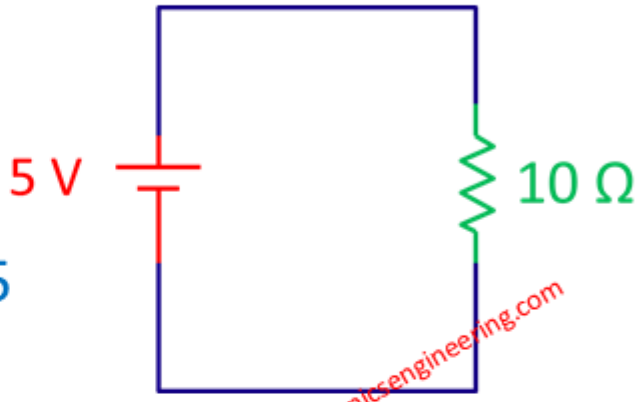
OR

The voltage across any resistor equals the current time resistance across it. Mathematicall $V = IR$



An Example

Find the current passing through 10 ohms resistor when a voltage source of 5 V connects across it.



$$I = \frac{V}{R} = \frac{5\ V}{10\ \Omega} = 0.5\ A$$

Other formulas

The electric power flowing through any circuit can be defined as the product of voltage times current passing through it. Mathematically (P=VI)

While the above statement is not a statement of Ohm's law, we can utilize it for obtaining some useful equations Using these we can calculate two of voltage, current, resistance and power from other two known quantities.

Ohm's law formulas		To Calculate			
		Voltage (V)	Current (I)	Resistance (R)	Power (P)
Given parameters	Current & Resistance	$V = IR$	---	---	$P = I^2R$
	Current & Power	$V = \frac{P}{I}$	---	$R = \frac{P}{I^2}$	---
	Voltage & Current	---	---	$R = \frac{V}{I}$	$P = VI$
	Voltage & Resistance	---	$I = \frac{V}{R}$	---	$P = \frac{V^2}{R}$
	Voltage & Power	---	$I = \frac{P}{V}$	$R = \frac{V^2}{P}$	---
	Power & Resistance	$V = \sqrt{P.R}$	$I = \sqrt{P/R}$	---	---

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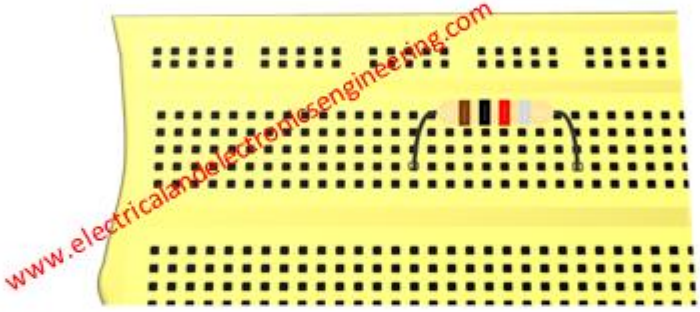
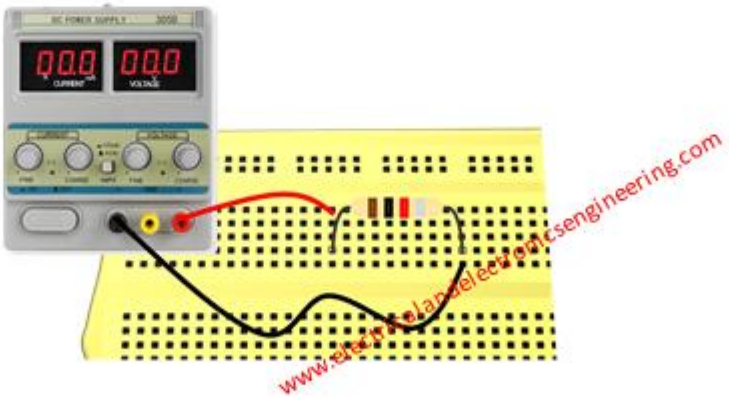
Ohm's law Experiment

Ohm's law can be easily verified using the experiment:

Step 1: Connect a resistor of 1kohm on breadboard

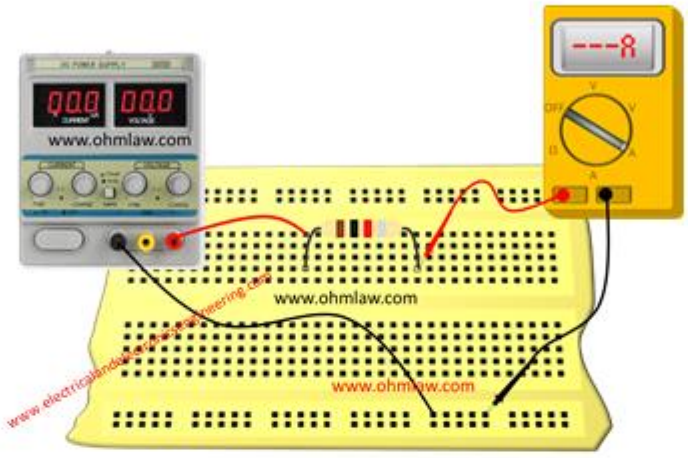


Step 2: Conneect a variable DC Power supply across it

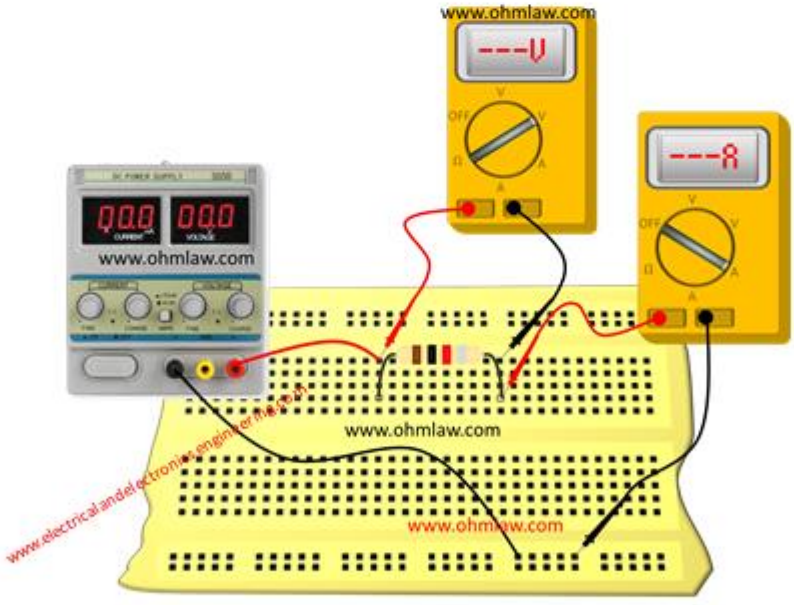


Ohm's law Experiment

Step 3: Connect ammeter in series of circuit



Step 4: Connect voltmeter in parallel to the resistor



Ohm's law Experiment

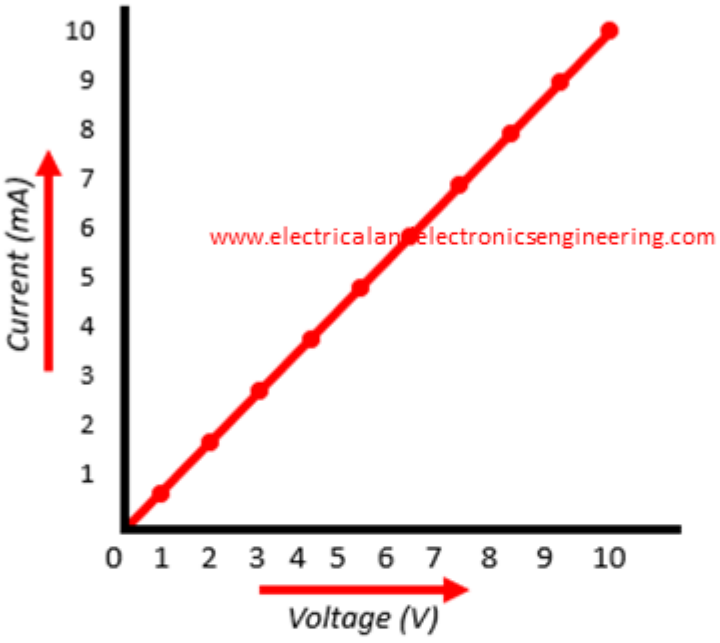
Step 5: Apply 1volt to resistor and take reading from ammeter
Step 6: Increase the voltage by 1 V and measure current
Step 7: Repeat the same steps from 1 V to 10 V and measure the current

Note the observations, finally you'll obtain a table like this:

Voltage	Current
1 V	1 mA
2 V	2 mA
3 V	3 mA
4 V	4 mA
5 V	5 mA
6 V	6 mA
7 V	7 mA
8 V	8 mA
9 V	9 mA
10 V	10 mA

Ohm's law Experiment

Let's sketch a graph for the readings:



As you can see the graph for Ohm's law is a linear straight line. This proves the direct relationship between voltage and current for a constant resistor

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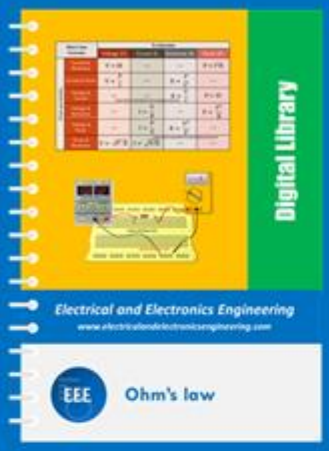

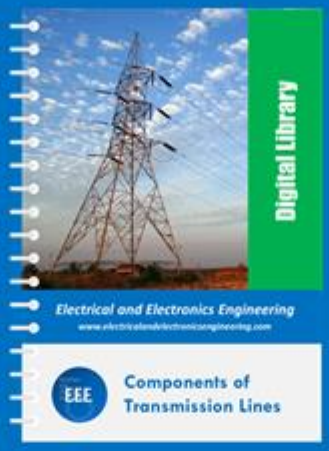

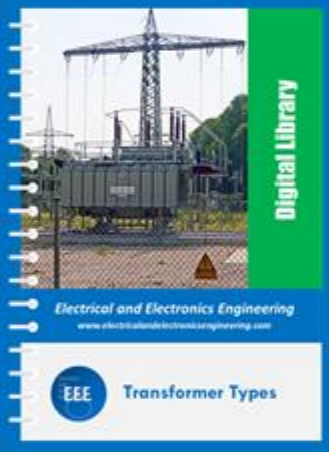

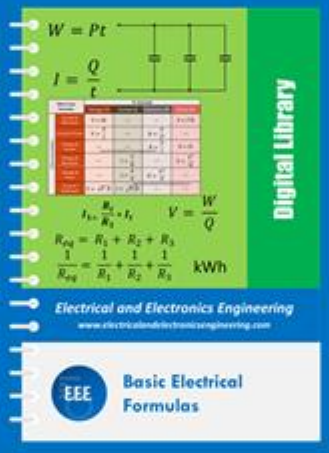

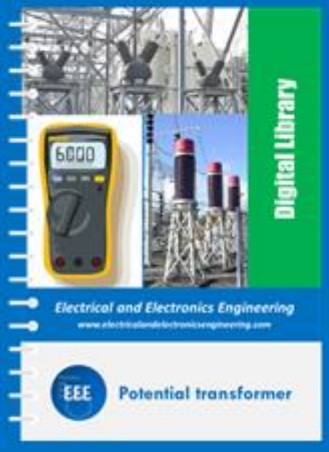

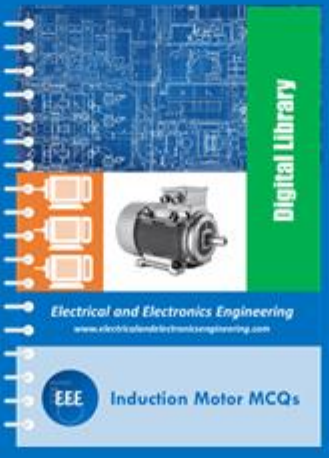

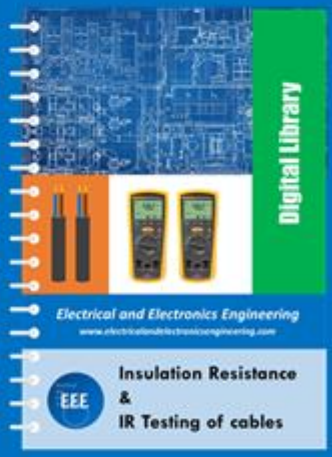

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