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Basic outline of electricity

This topic will illustrate general knowledge on Ohm's Law

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A C A D E M Y

What is Ohm's Law?

Ohm's Law defines one of most fundamental relationships in electronics. That is the relationship between Voltage, Current, and Resistance.

Once you understand the relationship of them you can calculate the relationship between voltage, current and resistance in an electrical circuit.
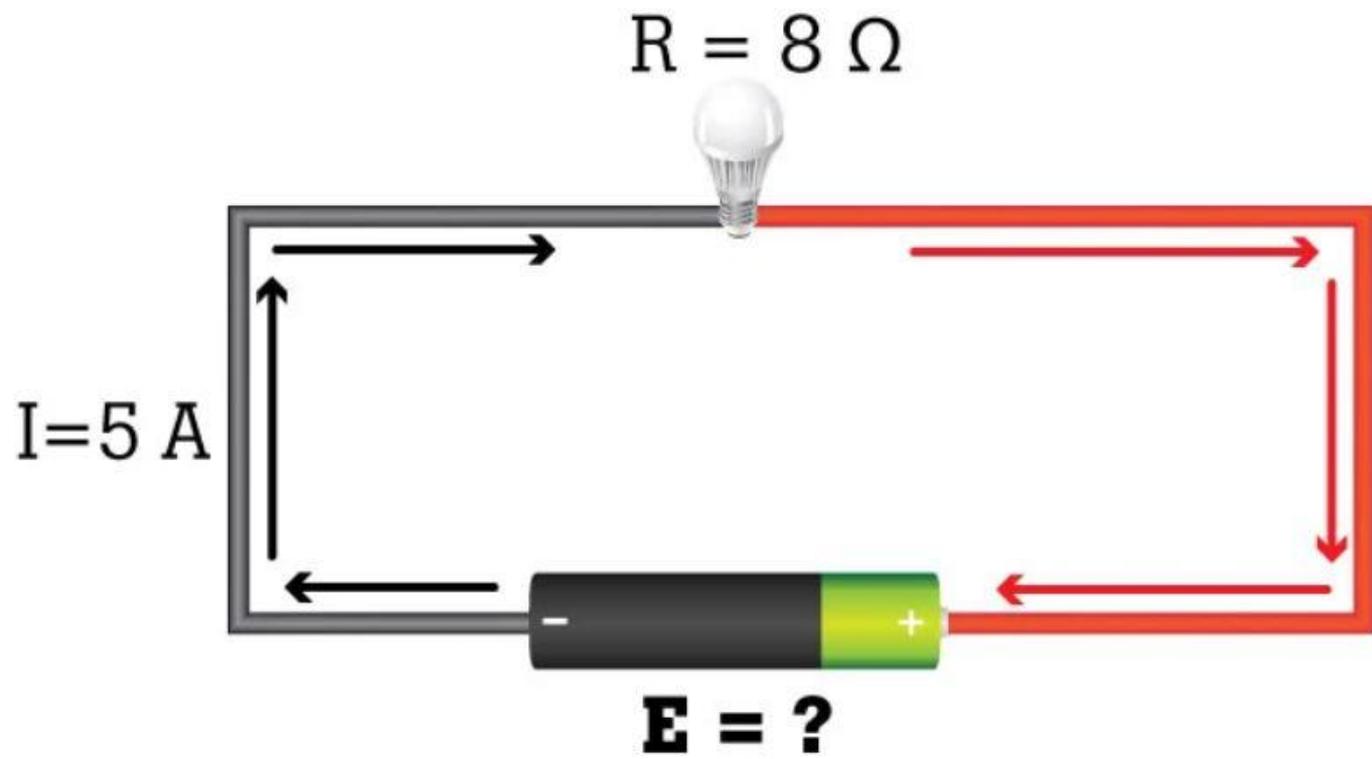
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The Forms of Ohm's Law:
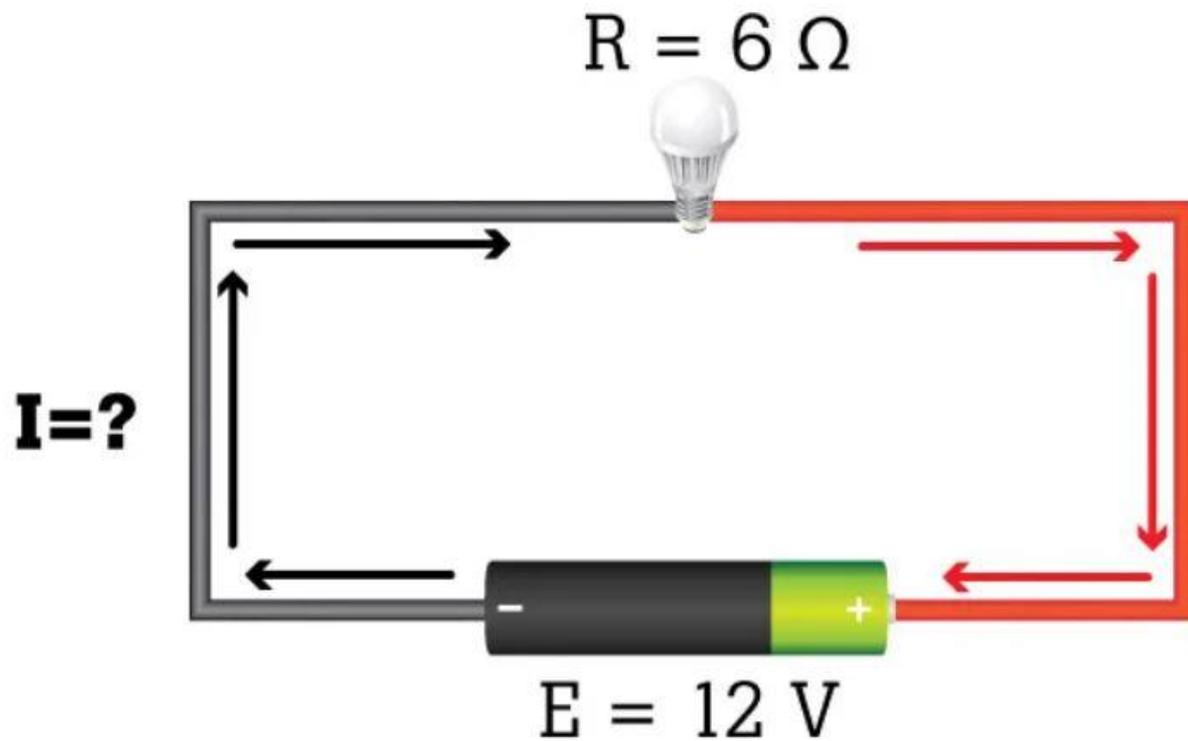
$$V = IR$$

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

$$R = \frac{V}{I}$$
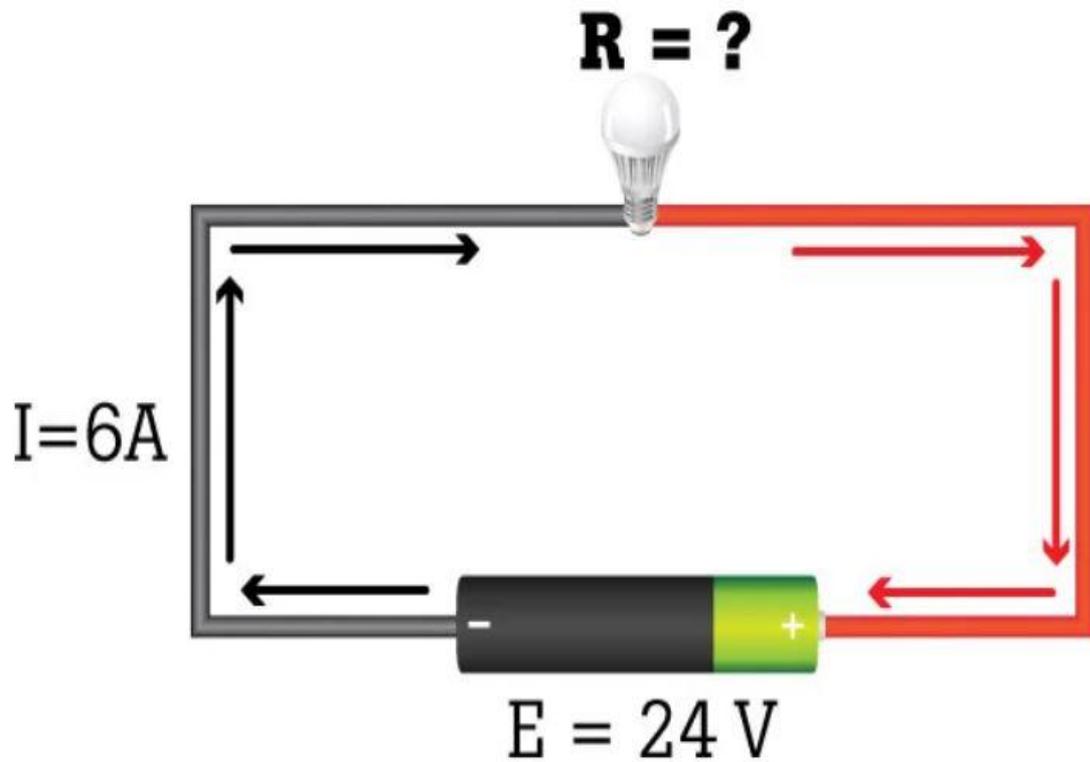
$$Where: V = volts, I = Amperes, R = \Omega (Ohms)$$

$R = 8\ \Omega$

$I = 5\ A$

$E = ?$

What is the voltage in the circuit?

$E = I \times R = (5A)(8\Omega) = 40\ V$

$$R = 6 \, \Omega$$

$$I = ?$$

$$E = 12 \, V$$

What is the current in the circuit?

I = E/R = 12V/6Ω = 2A

R = ?

I=6A

E = 24 V

What is the resistance created by the lamp?

R = E/I = 24V/6A = 4Ω

V = Voltage ➡ **V = I x R**

R = Resistance ➡ **R = V / I**

I = Current ➡ **I = V / R**

P = Power ➡ **P = V x A**

$$I = \sqrt{\frac{P}{R}}$$

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

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

$$V = \sqrt{P \times R}$$

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

$$V = I \times R$$

Amps **I**

Volts **V**

Watts **P**

Ohms(Ω) **R**

$$P = V \times I$$

$$P = I^2 \times R$$

$$P = \frac{V^2}{R}$$

$$R = \frac{P}{I^2}$$

$$R = \frac{V}{I}$$
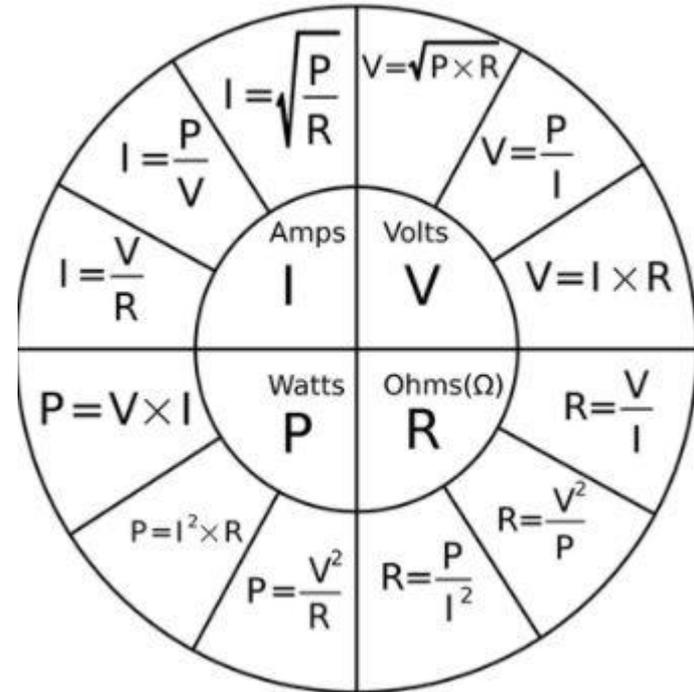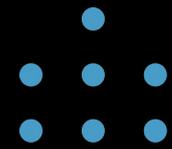
$$R = \frac{V^2}{P}$$
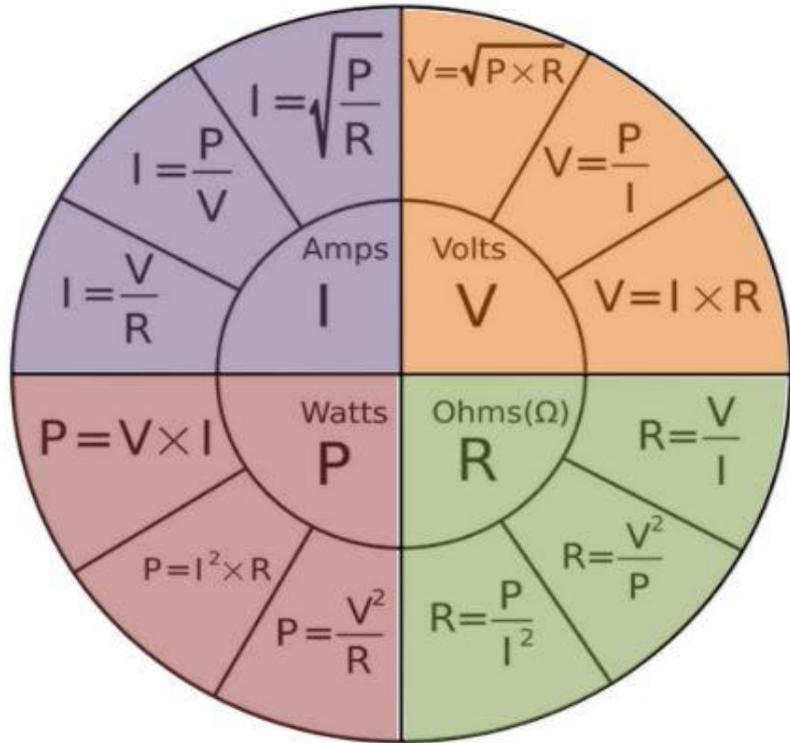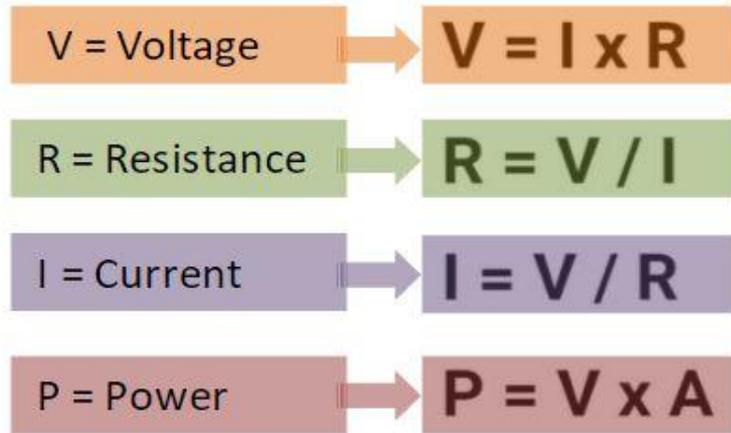
As in the previous formula wheel current is also know as amperage.

Voltage to Drain pump is 120v and resistance to drain pump is 14 ohms. What is the amperage draw of the drain pump?

$$I = \frac{V}{R} \quad = \quad \frac{120}{14} \quad = 8.5 \text{ AMPS}$$

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Volts

The unit that is used for measuring the parameter of voltage is the volt. The symbol that is used to represent the volt is the letter "V". Both uppercase and lower case is used depending on the situation. The symbol for the parameter of voltage is also the letter "V". If an electrical circuit were a garden hose, voltage would be similar to the pressure in the hose. The unit V is equal to the amount of energy, in Joules, required to move one column of electrons between two points. Voltage is sometimes referred to as "potential" because it has the potential to move those electrons.

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Ampere or Amps:

The unit that is used for measuring the parameter of current is the ampere. Ampere is often shortened to amp. The symbol used to represent the amp is the letter "A". Both upper and lower case is used depending on the situation. The symbol used to represent the parameter of current is the letter "I". If an electric circuit were a garden hose, current would be similar to the flow rate of the water in the hose. The unit A is equal to the number of coulombs flowing through the circuit in one second.

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Ohms

The unit that is used for measuring the parameter of resistance is the ohm. The symbol used to represent the ohm is Ω. The symbol used to represent the parameter of resistance is the letter "R". If an electric circuit were a garden hose, resistance would be any valve or other restriction in the hose. The unit Ω is equal to the resistance that exists when 1 A is flowing between two points with 1 V of voltage between those two points. This forms the basis for the forms of Ohm's law given in the next section.

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Power:

The unit that is most often used for measuring power in electronics is the watt. The symbol used to represent the watt is the capital letter "W". At its core, power is the rate at which work is done. In fact, one watt is equal to one joule per second. From the definitions given for Volts and Amps given above, we can say that one watt is also equal to one volt multiplied by one amp because the volt is the measure of joules per coulomb and the amp is the measure of coulombs per second. Coulombs cancel out and we are left with joules per second.

The Forms of Watt's Law:

$$P = VI$$

$$P = I^2 R$$

$$P = \frac{V^2}{R}$$

$$Where: P = Watts, \qquad V = volts, \qquad I = Amperes, \qquad R = \Omega(Ohms)$$