Mf kqj_u Terms:

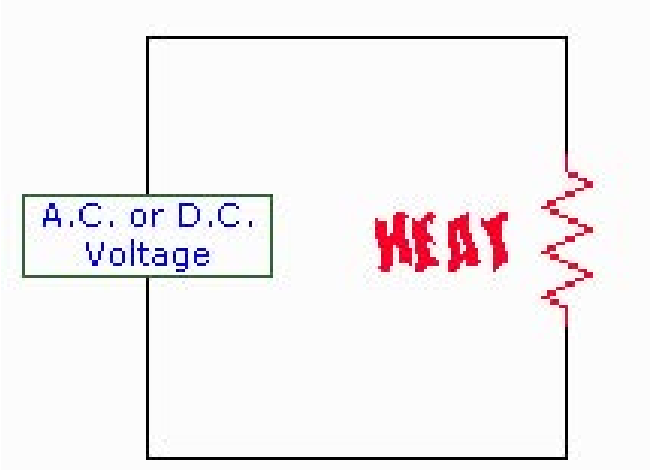
- **(I) Current** is what flows on a wire or conductor like water flowing down a river. Current flows from points of high voltage to points of low voltage on the surface of a conductor. Current is measured in (A) amperes or amps.
- **(E) Voltage** is the difference in electrical potential between two points in a circuit. It's the push or pressure behind current flow through a circuit, and is measured in (E) volts.
- **(R) Resistance** determines how much current will flow through a component. Resistors are used to control voltage and current levels. A very high resistance allows a small amount of current to flow. A very low resistance allows a large amount of current to flow. Resistance is measured in ohms.
- **(P) Power** is the amount of current times the voltage level at a given point measured in wattage or watts.

Introduction:

Ohms law, sometimes more correctly called Ohm's Law, named after Mr. Georg Ohm, mathematician and physicist born 1789 and died 1854 in Bavaria, defines the relationship between power, voltage, current and resistance. These basic electrical units apply to direct current, or alternating current. Ohm's Law is the foundation of electronics and electricity. These formulae are **very easy to learn** and are used extensively by electricians. Without a thorough understanding of "Ohm's Law" an electrician would either design or troubleshoot even the simplest of electronic or electrical circuits. Ohm established in the late 1820's that if a voltage was applied to a resistance then "current would flow and then **power** would be consumed".

Components:

1. Explain:



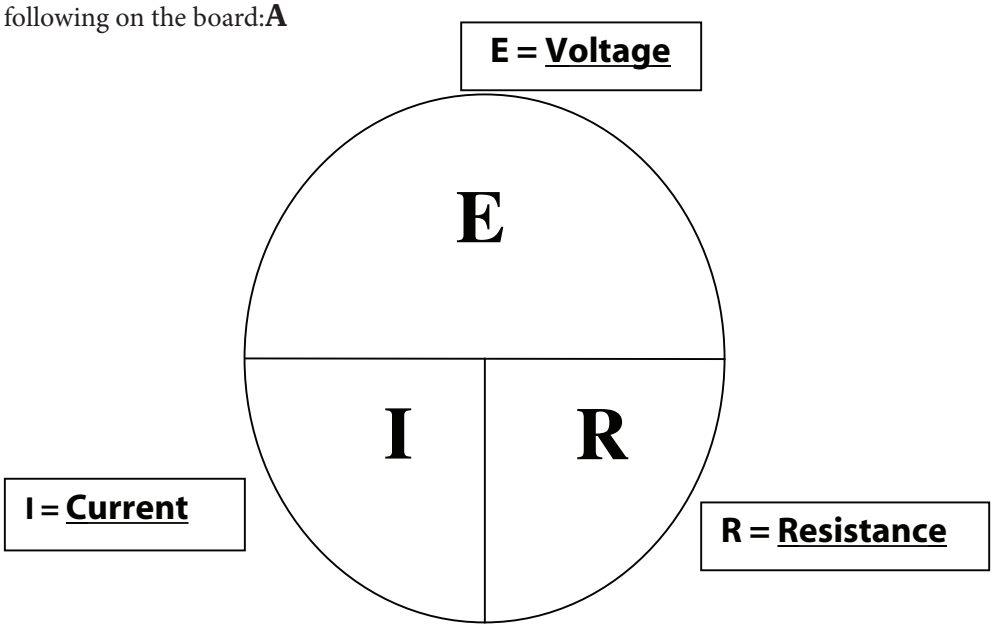
Ohm's Law power consumption through a resistance

Some practical every day examples of this basic rule are: base board heaters, electric frying pans, toasters and electric light bulbs. The heater consumes power producing heat for warmth, the frying pan consumes power producing heat for general cooking, the toaster consumes power producing heat for cooking toast, and the electric light bulb consumes power producing heat and more important light. A further example is an electric hot water system. All are examples of Ohm's Law at its most basic.

2. Current is directly proportional to voltage. If voltage is increased by a given percentage, current increase by the same percentage. If the voltage is decreased by a given percentage, current decreases by the same percentage.

3. Current is inversely proportional to resistance. An increase in resistance results in a decrease in current. A decrease in resistance results in an increase in current. It is important to note that resistance cannot be changed by changing voltage or current. Resistance in a circuit is a physical constant. Resistance in a circuit can only be changed by changing components or resistors rated at more or fewer ohms.

4. Draw the following on the board:**A**



Aoverr the desired value
and solving the equation

5. For the following examples, voltage is E with an assigned a value of 12V, Current is I and is 2 amperes while resistance is R of 6 ohms. Note that "x" means multiply by, while "/" means divide by.

   a. For voltage [E = I x R] (COVER "E" WITH HAND)
      1. E (volts) = I (current) x R (resistance) OR
      2. 12 volts = 2 amperes x 6 ohms
   b. For current [I = E / R] (COVER "I" WITH HAND)
      1. I (current) = E (volts) / R (resistance) OR
      2. 2 amperes = 12 volts / 6 ohms
   c. For resistance [R = E / I] (COVER "R" WITH HAND)
      1. R (resistance) = E (volts) / I (current) OR
      2. 6 ohms = 12 volts / 2 amperes

6.

For power:

$P = E^2 / R$ OR Power = 24 watts = 122 volts / 6 ohms

Also $P = I^2 \times R$ OR Power = 24 watts = 22 amperes x 6 ohms

Also $P = E \times I$ OR Power = 24 watts = 12 volts x 2 amperes

That's all you need for Ohm's Law - remember just two formulas:

- For voltage: **$E = I \times R$**
- For power: **$P = E^2 / R$**

7. Review relationship of the formula for voltage, resistance and current

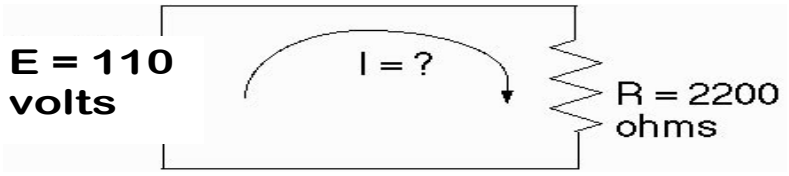
a. E=I x R
b. R=E/I
c. I= E/R

Name _____

Electricity and Ohm's Law Worksheets

Problem #1

A 110 volt wall outlet supplies power to a strobe light with a resistance of 2200 ohms. How much current is flowing through the strobe light?



Choose your answer below

1. 0.5 amps
2. 2.0 amps
3. 0.05 amps
4. 1.0 amps

Problem #2

A CD player with a resistance of 40 ohms has a current of 0.1 amps flowing through it. Sketch the circuit diagram and calculate how many volts supply the CD player.

Choose your answer below

1. 0.0025 volts
2. 4.0 volts
3. 10.0 volts
4. 400.0 volts

Problem #3

A 120-volt power source supplies a lamp with a resistance of 192 ohms. What is the current flow of the circuit?

Problem #4

What is the resistance of the circuit conductors when the conductor voltage drop is 3 volts and the current flowing through the conductors is 100 amperes?

Problem #5

Given: I = 15A, R = 2 , find E

Problem #6

Given: E = 250V, R = 5 , find I

Problem #7

Given: E = 100V, I = 0.01A, find R