OHMS LAW

Ohm's law magic triangle

$$E = I\,R$$

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

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

Ohms law,
defines the relationship between 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.

This formula is used extensively by electricians.
Without a thorough understanding of "Ohm's Law" an electrician ***can not*** design or troubleshoot even the simplest of electronic or electrical circuits.

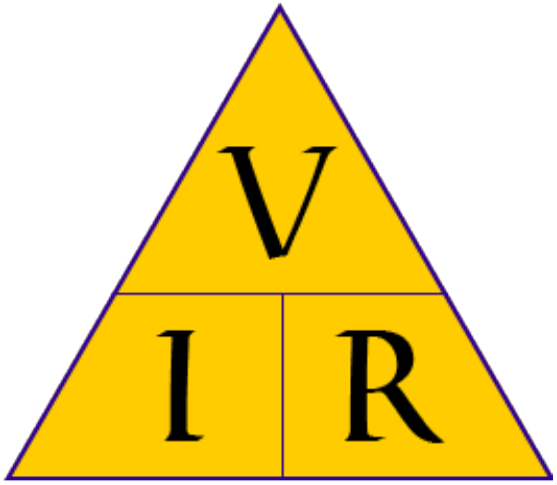
Ohm established in the late 1820's that if a voltage was applied to a resistance then "current would flow and then **power** would be consumed".

Voltage measured in *volts*, symbolized by the letters "E" or "V".

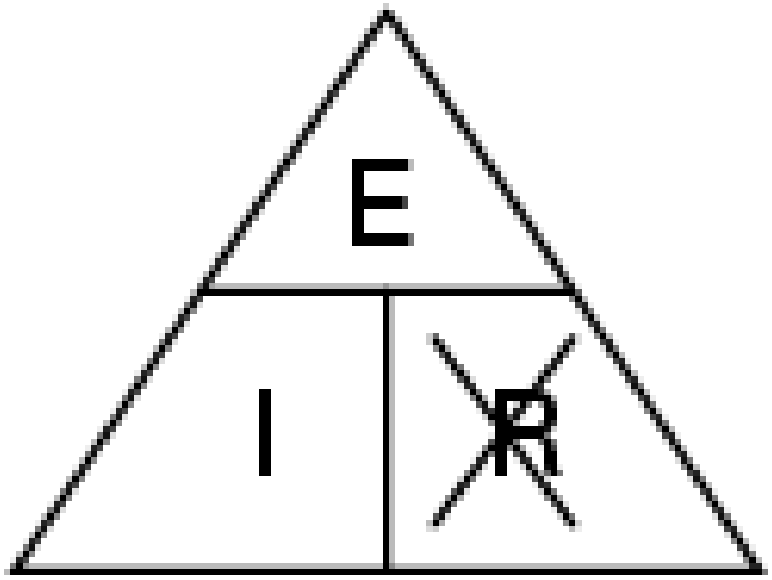
Current measured in *amps*, symbolized by the letter "I".

Resistance measured in *ohms*, symbolized by the letter "R".

Quantity	Symbol	Unit of Measurement	Unit Abbreviation
Current	I	Ampere ("Amp")	A
Voltage	E *or* V	Volt	V
Resistance	R	Ohm	Ω

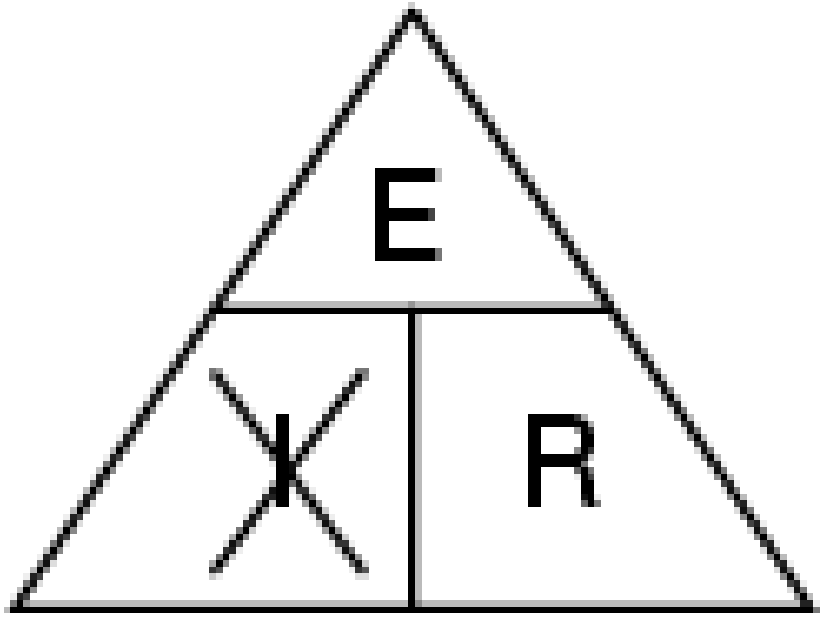


If you know E and I, and wish to determine R, just eliminate R from the picture and see what's left:



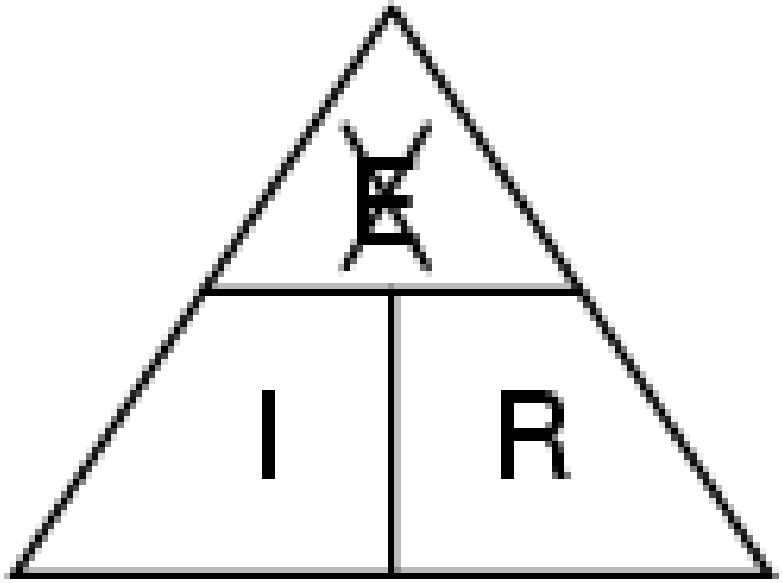
$$R = \frac{E}{I}$$

If you know E and R, and wish to determine I, eliminate I and see what's left:



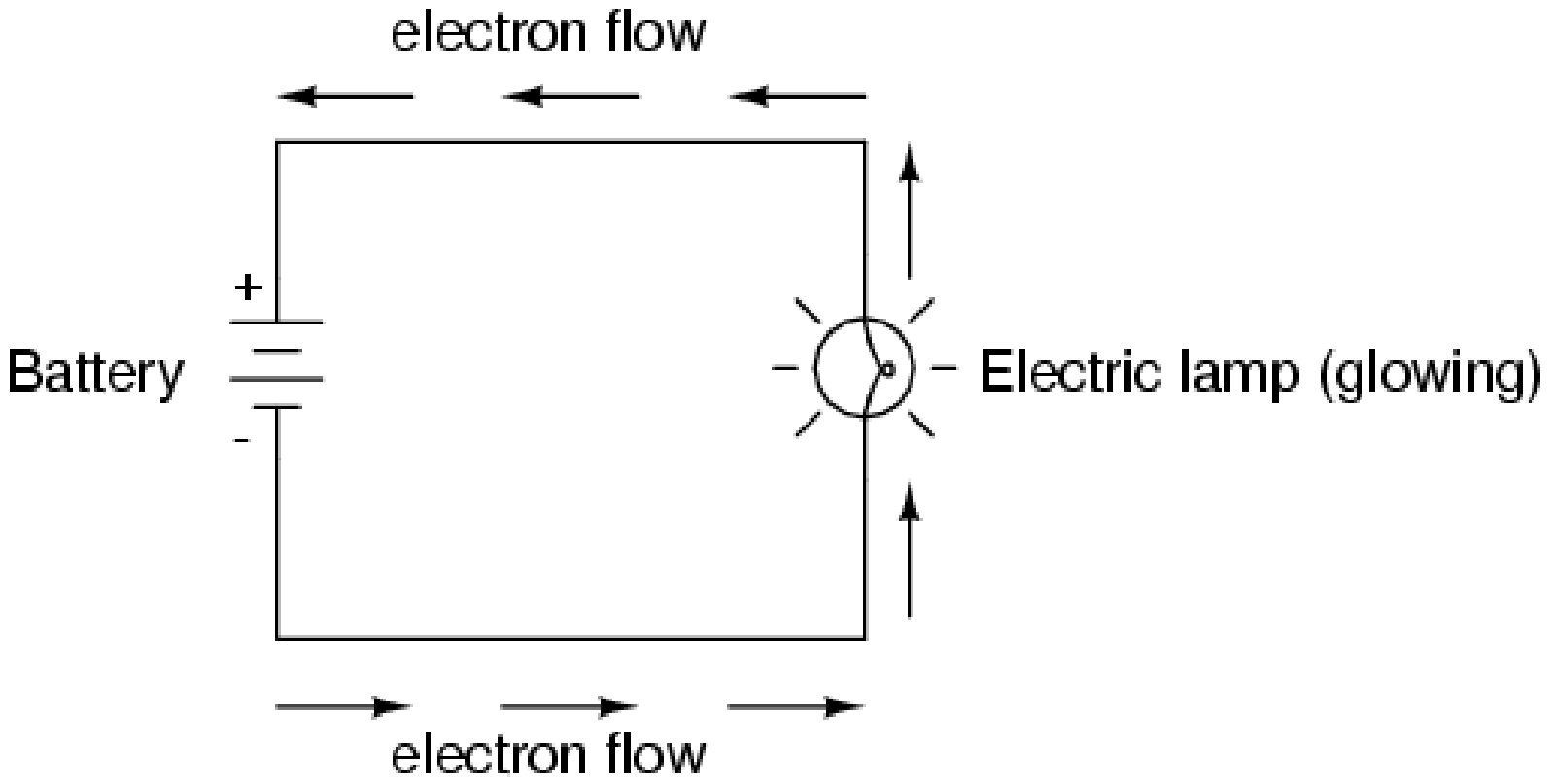
$$I = \frac{E}{R}$$

if you know I and R, and wish to determine E, eliminate E and see what's left:



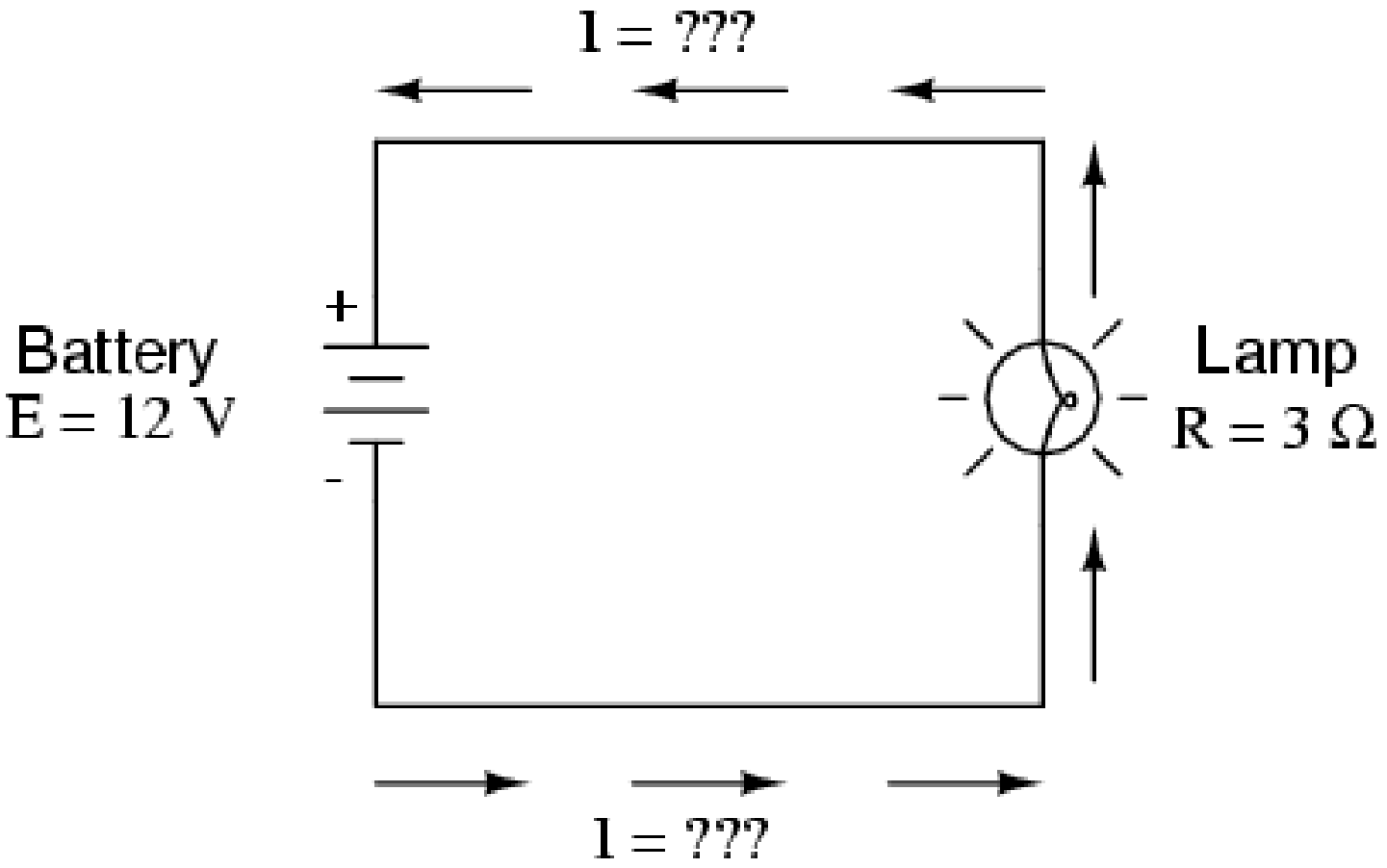
$$E = I\,R$$

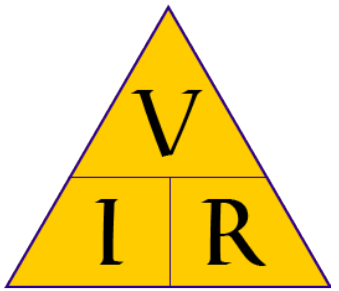
Let's see how these equations might work to help us analyze simple circuits:



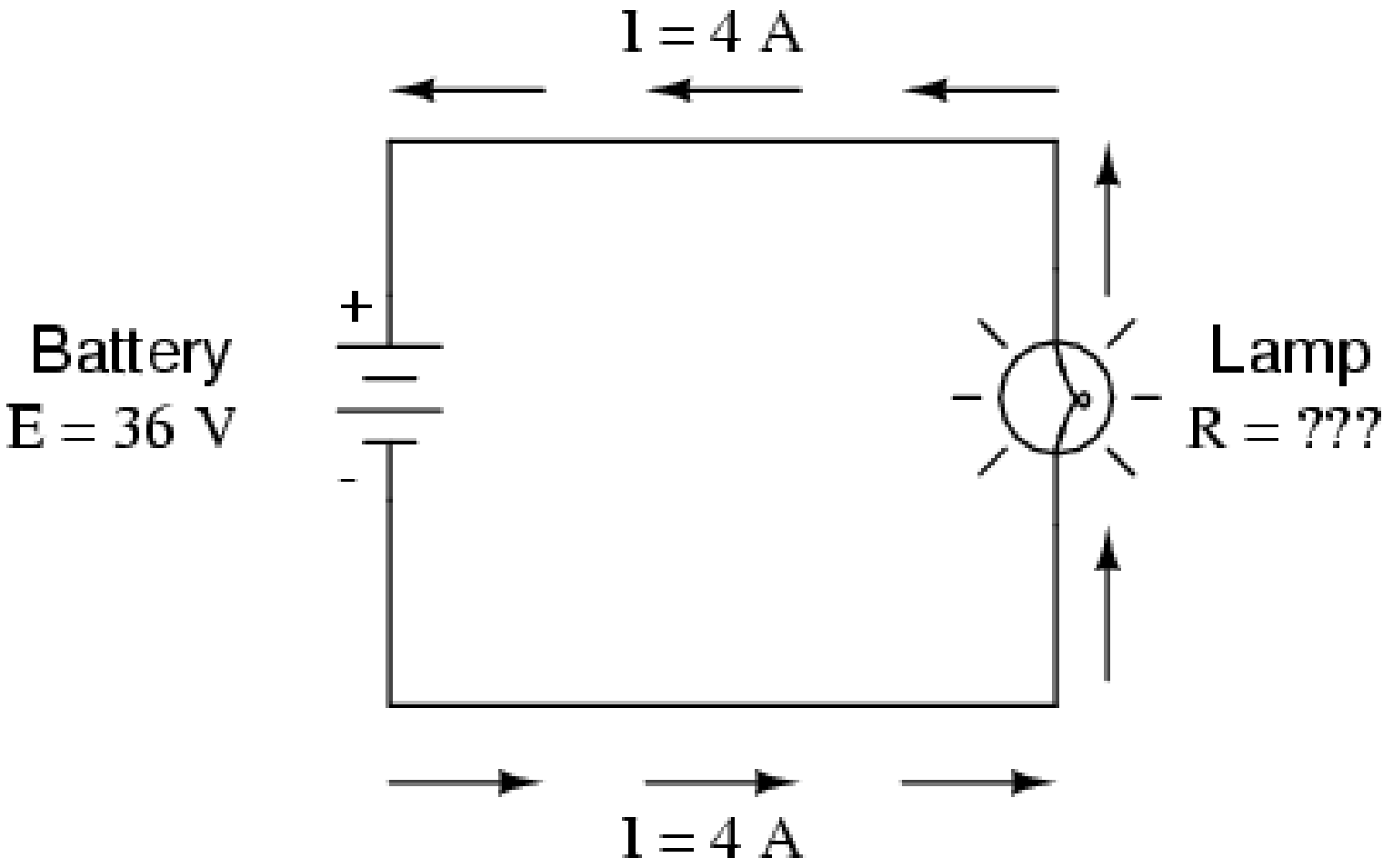
If we know the values of any two of the three quantities (voltage, current, and resistance) in this circuit, we can use Ohm's Law to determine the third.

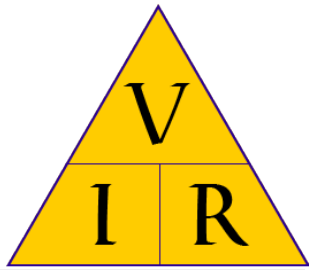
calculate the amount of current (I) in a circuit, given values of voltage (E) and resistance (R):



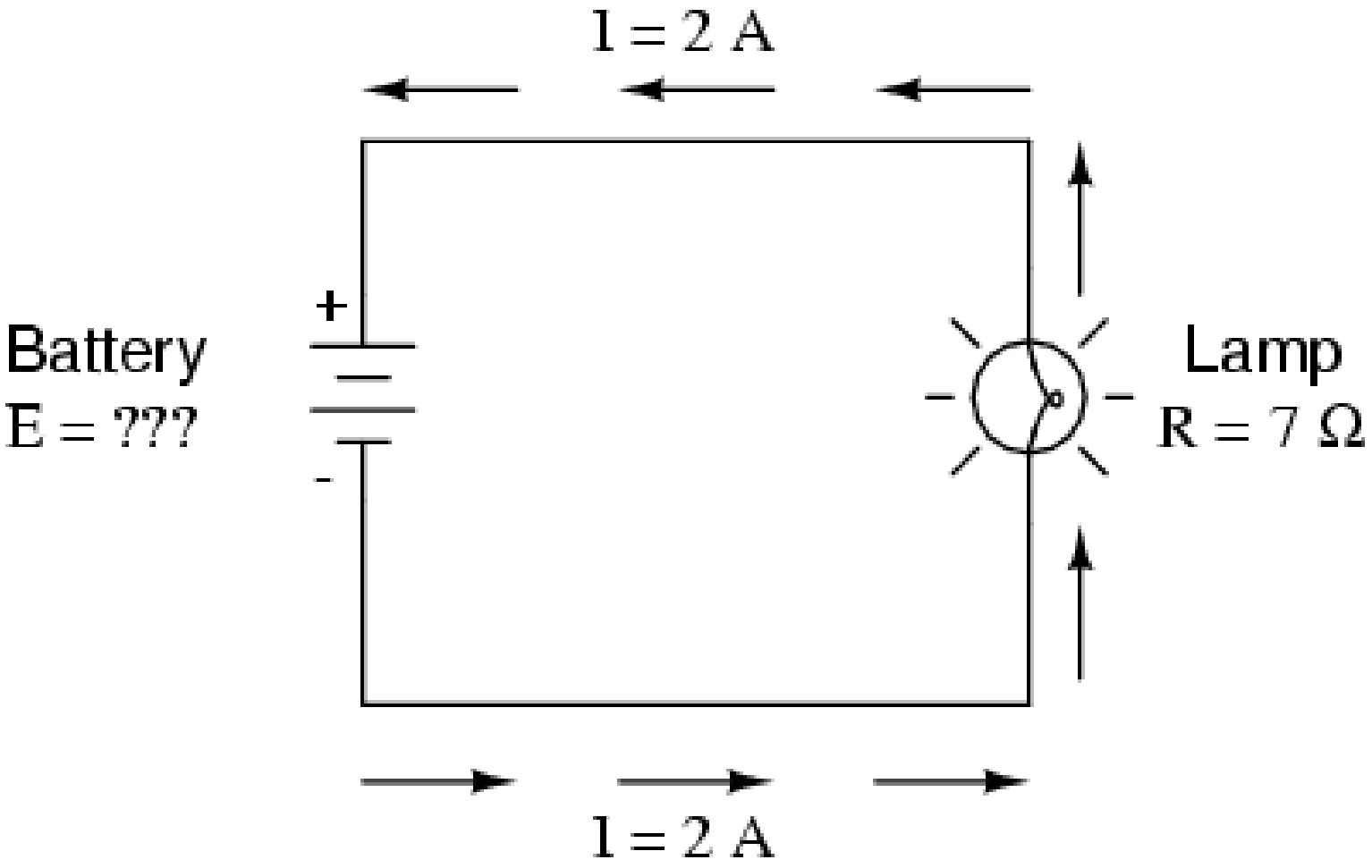


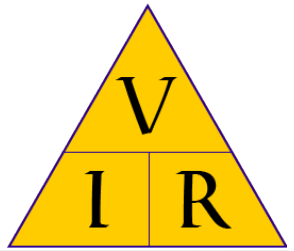
calculate the amount of resistance (R) in a circuit, given values of voltage (E) and current (I):

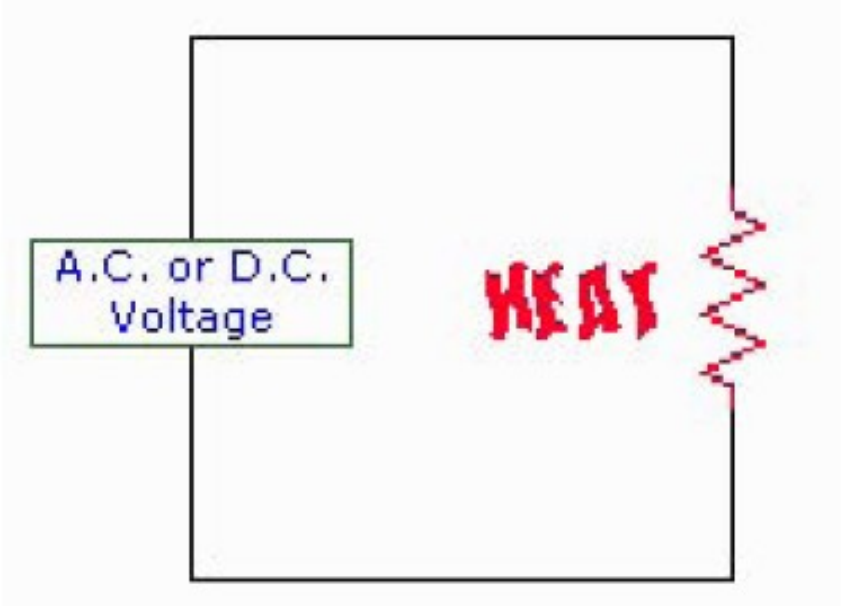




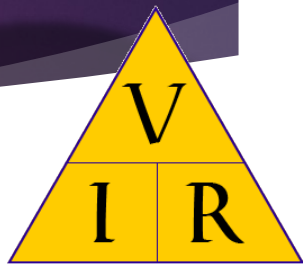
calculate the amount of voltage supplied by a battery, given values of current (I) and resistance (R):



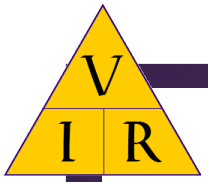




Ohm's Law power consumption through a resistance

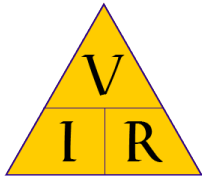


Some practical every day examples of this basic rule are: base board heaters, electric frying pans, toasters
and electric light bulbs. The heater consumes power producing heat for warmth, the frying pan consumes
power producing heat for general cooking, the toaster consumes power producing heat for cooking 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.



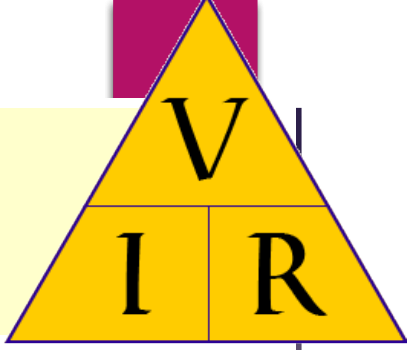
Ohm's Law

	Resistance	Current	Voltage
Definition	The opposition to the flow of charges	The flow of electrons through a circuit	Potential Difference (the push behind electricity)
Symbol	R	I	V
Equation	$R = \frac{V}{I}$	$I = \frac{V}{R}$	$V = I R$



	Resistance	Current	Voltage
Label	Ω - Omega symbol	A - amperes	V - volts
Depends on	**The size of the wire.** Thick wire – Less resistance Thin wire – More resistance Long wire – more resistance Short wire- less resistance	The resistance in the circuit Greater resistance- less current Less resistance the greater the current	The voltage source Greater Potential difference = greater voltage

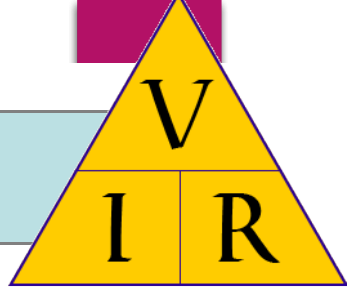
Practice problem



- You light a light bulb with a 1.5 volt battery. If the bulb has a resistance of 10 ohms, how much current is flowing?

1. Write the equation → $I = \frac{V}{R}$
2. Replace the known values → $I = \frac{1.5}{10}$
3. Solve → $I = 0.15$

Ohm's Law



	Resistance	Current	Voltage
Definition	The opposition to the flow of charges	The flow of electrons through a circuit	**The force or pressure behind electricity**
Symbol	R	I	V
Equation	$R = \frac{V}{I}$	$I = \frac{V}{R}$	$V = I R$

	Resistance	Current	Voltage
Label	Ω - Omega symbol	A - amperes	V - volts
Depends on	**The size of the wire.** Thick wire – Less resistance Thin wire – More resistance Long wire – more resistance Short wire- less resistance	The resistance in the circuit Greater resistance- less current Less resistance the greater the current	The voltage source Potential difference

- If you know two of the three variables you should be able to solve for the third.
- When using Ohm's law always use the 3 step form
  - 1. Write the equation
  - 2. Replace the known values
  - 3. Solve the problem

    Label with the correct unit of measurement.

milliamp or just mA

Converting Current Values

To convert amperes to milliamps (and vice versa) just move the decimal point three places.

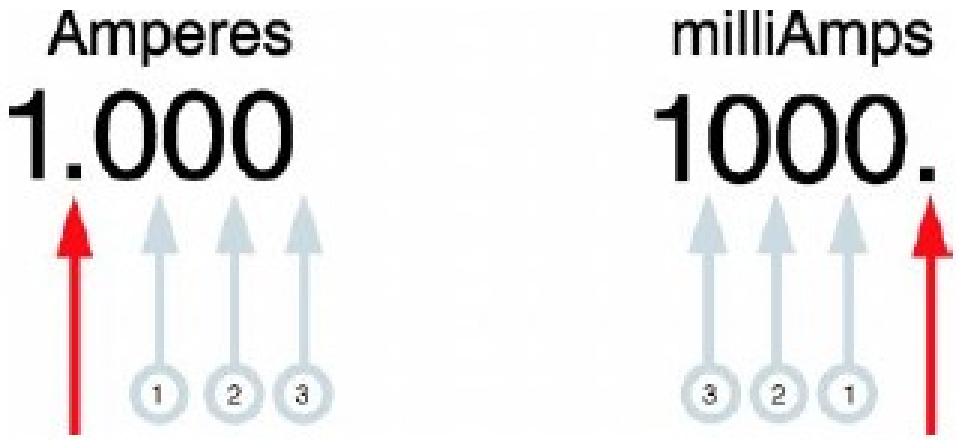


Fig. 1-16
TL623f116c

1000 milliamps = 1 amp

“

THANK YOU

”