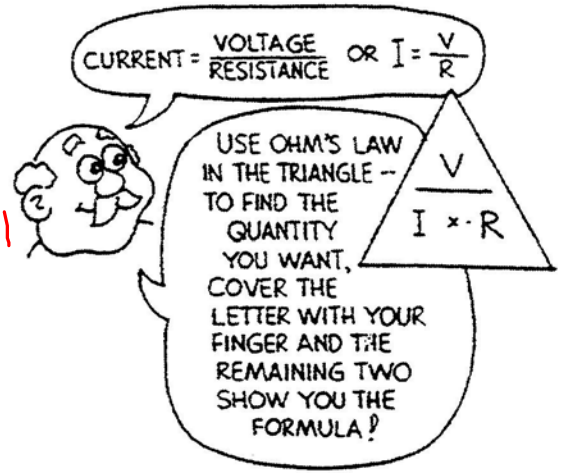
Intro to OHM'S LAW

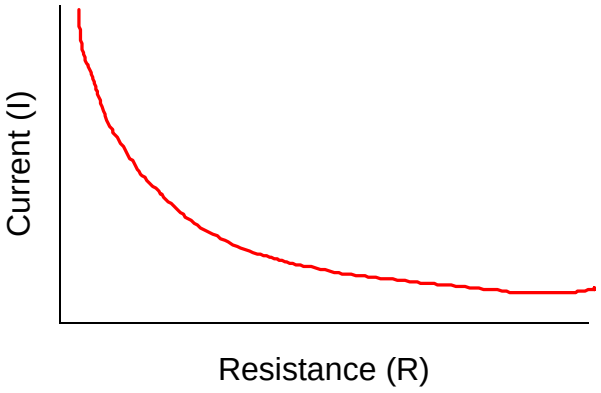


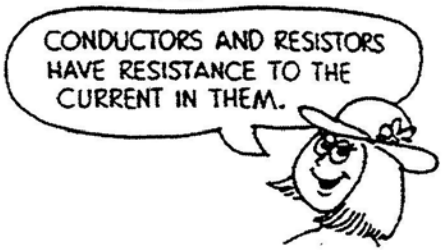
1. From the Ohm's Law lab, what relationship did you find between Current and resistance?

   IR = CONSTANT

   I is Inversly Proportional To R

2. Graph the relationship below:





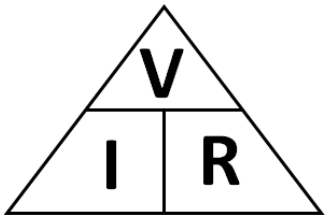
3. What is the equation for this relationship?

   $I = \frac{\text{CONSTANT}}{R} \Rightarrow I = \frac{V}{R}$ or $V = IR$

4. How is Ohm's Law in electric circuits similar to Newton's Second Law in Mechanics?

$I = \frac{V}{R}$	$a = \frac{F}{m}$
1) Voltage causes current (Flow of e^-)	1) Force causes acceleration
2) Resistance Reduces current (Flow of e^-)	2) Mass (Inertia) Resists acceleration

Intro to OHM'S LAW Example Problems



1. How much current flows in a 1000-ohm resistor when a voltage of 1.5 V is impressed across it?

$I = \frac{V}{R} = \frac{1.5}{1000} = 1.5 \times 10^{-3}$ Amps

0.0015 Amps

2. If the filament resistance in an automobile headlamp is 3 ohms, how much current does it draw when connected to a 12-V battery?

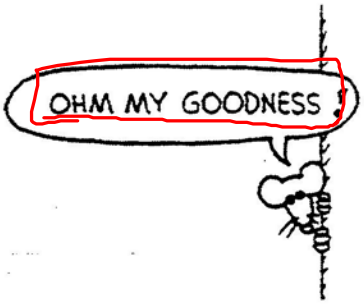
$I = \frac{V}{R} = \frac{12}{3} = 4.0$ Amps

b. What is the power rating of the bulb?

$P = IV = (4.0)(12) = 48$ watts

3. What is the current in the 30-ohm heating coil of a coffee maker that operates on a 120-V circuit?

$I = \frac{V}{R} = \frac{120}{30} = 4.0$ Amps



4. How much resistance allows an impressed voltage of 6 V to produce a current of 0.006 A?

$V = IR$

$R = \frac{V}{I} = \frac{6}{.006} = 1000\ \Omega$

5. What is the voltage across a 100-ohm circuit element that draws a current of 1 A?

$V = IR = (1)(100) = 100$ Volts

6. The current in an incandescent lamp is 0.5 A when the lamp is connected to a 120-V circuit, and 0.2 A when it is connected to a 10-V source. Does the resistance of the lamp change in these cases? Explain your answer and defend it with numerical values.

(120) $R = \frac{V}{I} = \frac{120}{0.5} = 240\ \Omega$ Brighter ✓

(10) $R = \frac{V}{I} = \frac{10}{.2} = 50\ \Omega$

Brighter = Hotter = Hotter = R ↑

Ohm's Law – Problem set 1

V = I·R ***P = I·V*** ***Energy converted = Power x Time***

1. Find the missing quantities in each of the following:

   a) Potential difference is 120 V and the current is 30 A, what is the resistance? (4 Ω)

   b) R = 30Ω and the battery supplies 5.0 V, What it the current? (0.167 A)

   c) If a 6 A current flows through a circuit with 200 Ω of resistance, what is the potential difference across the circuit? (1200 V)

2. An electric heater produces heat by applying a potential difference of 50 V across a nichrome wire with a total resistance of 8.0Ω.
   a) find the current in the wire *(6.25 A)*

   b) Determine the power rating of the heater. *(313 W)*

3. A potential difference or 120 V is applied across a 75 W light bulb.
   a) Find the current flowing through the bulb *(0.63 A)*

   b) Determine the resistance of the bulb. *(190Ω)*

4. How much does it cost to burn a 100 W bulb for 24 hours if electricity cost $0.08 per kilowatt-hour? (Remember that a kilowatt-hour is a unit of energy) - USE THE FACTOR LABEL METHOD, KEEP TRACK OF UNITS *($0.19)*