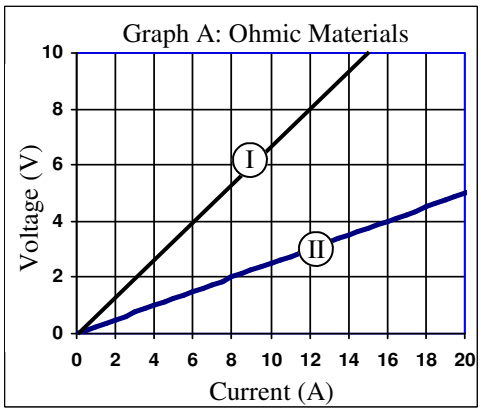
A-Day: Due Fri., Feb 18
B-Day Due Tues., Feb 22

2011 PreAP Circuits 2

1. *Do the back of the "Total Resistance" Worksheet, titled "Electrical Power". The key is online.*

Let's learn about factors that affect resistance. (Holt Physics p. 701.)



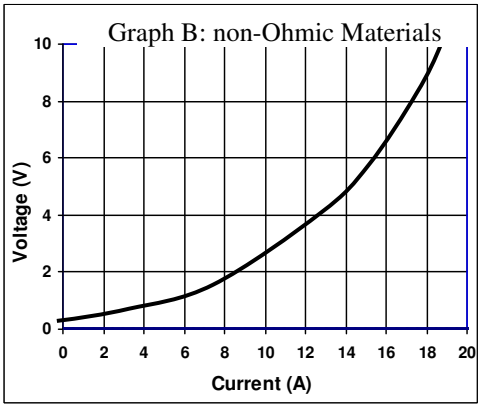
Wire length: longer wires have more resistance. Why? Longer wire = more collisions for the electrons = more resistance.

Temperature: material tend to have higher resistance at higher temperatures. Why? Higher temperature = molecules of the conductor moving faster = more collisions for the electrons = more resistance.

Wire thickness: thicker wires have less resistance. Why? Wider wire = more paths for the electrons to flow = less resistance.

Material: certain materials have better conductivity. Starting with the best conductor: Conductors: (Silver; Copper; Gold; Aluminum; Tungsten; Iron) Semiconductors: (Carbon; Silicon; Germanium); Insulators: (Air; Rubber; Paper; Plastics; Glass). So a good conductor is a bad insulator and vice versa.

So, resistance is directly proportional to wire length and temperature and inversely proportional to wire thickness.



Superconductors—materials that have very low or no resistance below a certain temperature. This temperature is known as the critical temperature. A superconductor is a MUCH better conductor than even silver or copper (it's SUPER!).

Ohmic vs non-ohmic materials: Many materials follow Ohm's Law: R = V/I. As the voltage increases, the current increases at the same rate OR the resistance stays constant. A non-Ohmic materials may increase its resistance as the current increases (like many light bulbs). Graph A shows two different Ohmic materials; Graph B shows a non-Ohmic material.

2. Would the resistance increase or decrease?

A. ____ Using a shorter wire.
B. ____ Cooling the wire.
C. ____ Using a thicker wire.
D. ____ Changing from gold to silver.

3. For each of the following pairs, circle the one with the greatest resistance.

A. A 25 Ω resistor at 5°C or at 25°C?
B. A 5 cm long wire or a 5 meter long wire?
C. A wire with a cross-sectional area of 3 cm^2 or 6 cm^2?
D. Aluminum wires or Copper wires?
E. Silver wires or wires made with a superconductor?
F. An insulator or a conductor?

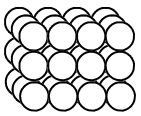
Remember that in ANY equation that has division means slope. Ex: V = D/T so slope of distance vs time graph = Velocity. Ex: W = Fd so F = W/d and force would be the slope of a Work vs distance graph.

4. Calculate the resistance of material 1 on Graph A above.

5. Calculate the resistance of material 1 on Graph A above.

6. Material 1 or material 2 on Graph A above:
A. Would be a wire at a lower temperature?
B. Would be a longer wire?

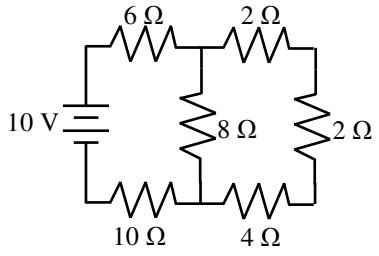
The picture at the left shows a lattice, which is a reoccurring structure. The picture at he right shows molecules in the solid phase of matter. In a solid the molecules are locked in a repeated pattern known as a crystal lattice. "Crystal" means it has a repeated, regular pattern.

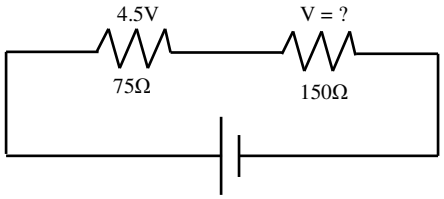


7. In a insulator the v_____ electrons are easy or hard to remove?
8. In a conductor the electrons are _____ to move thru the solid's crystal lattice.

9. Find the total resistance of the following circuit and the current flowing thru the battery. You must redraw at least twice.

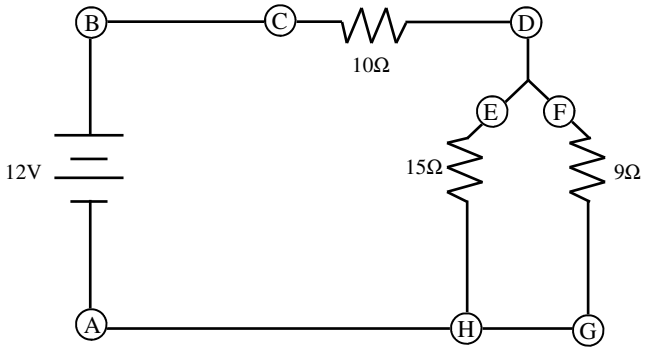
	Redraw 1:	Redraw 2:





10. Figure out the voltage of the battery. You have enough information.

11. Before you answer the questions it would be better if you work the circuit. If you need to redraw, do so. I did not take time to work out even numbers.



A. Calculate the total current flowing thru the battery.

B. Calculate the voltage used by the 10Ω resistor.

C. Determine the voltage at point D.

D. How much current flows thru the 9Ω resistor.

12. And do TAKS day 8 on "DNA/RNA Structure".