2009 Electricity 9
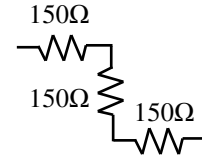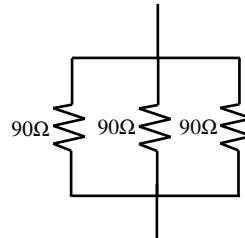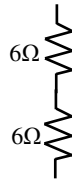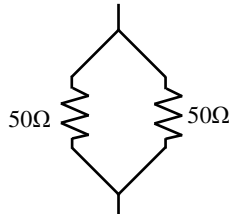
NOTE: For B-day this homework is due the Friday AFTER TAKS. Your TAKS homework is due before TAKS.
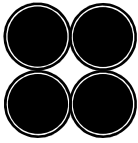
1. The holes at the left are pipes.
   A. Are the four holes in parallel or series, as shown?
   B. Together is there a bigger hole or a smaller hole for water to flow thru?
   C. Each pipe can allow 2 gal/sec, how much can flow thru them together?
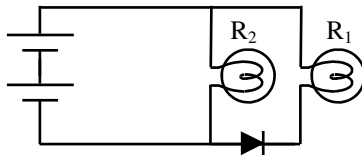   D. So, is the resistance increasing or decreasing?
   This is why 4 equal resistors in parallel are the same as a single resistor that is 1/4th as big.

2. For each of the following examples decide if they are in parallel or series and calculate the total resistance.

   A. Parallel or series?
      R_{total} = _____

   B. Parallel or series?
      R_{total} = _____

   C. Parallel or series?
      R_{total} = _____

   D. Parallel or series?
      R_{total} = _____

From the Lab:

3. Explain what a diode does in a circuit.

4. In the circuit at the left, R_1 isn't working. Without doing anything to the light bulbs, what is one change that would make R_1 turn on?

5. Given these two light bulbs: 5Ω and 8Ω.
   A. When in series, which light bulb is brighter?
   B. Why?

   C. When in parallel, which light bulb is brighter?
   D. Why?

   E. Is your house in parallel or series?
   F. Which is the bigger resistor: a 40W bulb or a 80W bulb?

6. The following questions will be easy if you work the circuit first.
   A. What is the current flowing thru the 3Ω resistor?

   B. How much voltage is used by the 9Ω resistor?

   C. What is the voltage at point E?

   D. How much power is used by the 6Ω resistor?

   E. What is the total power used by the circuit?
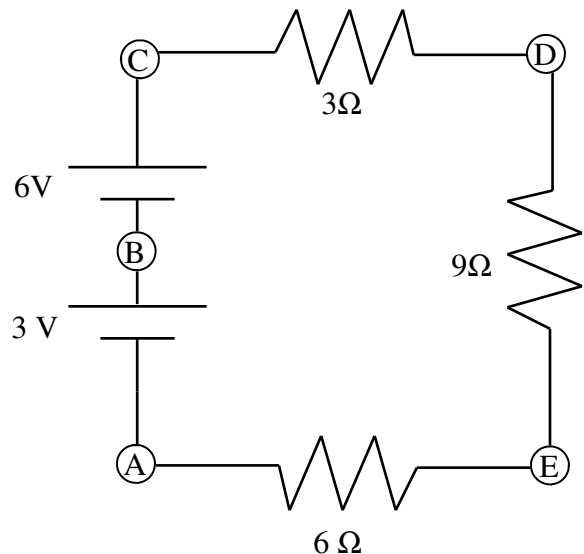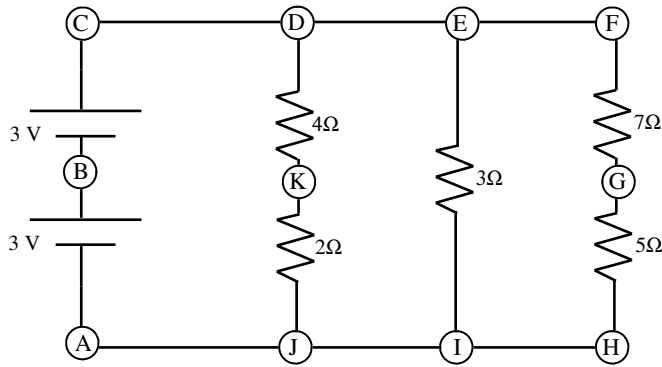
7. After you have worked the circuit, answer the following questions.
   A. What is the voltage at F?
   B. What is the voltage at H?
   C. What is the current from F to H?
   D. What is the current from I to J?
   E. What is the current from C to D?
   F. What is the current in the 4Ω resistor?
   G. What is the voltage used by the 4Ω resistor?

   H. What is the voltage at point K?
   I. What is the power used by the 3Ω resistor?

   J. What is the total power used by the circuit?

   K. Since P = W/t (or P = Energy/time), how much energy is used by the whole circuit in 10 seconds?

8. Remembering that 1 electron = -1.6x10^{-19}C...
   A. How many electrons does it take to make a charge of 6.8µC?

   B. What is the charge of 8.5 electrons?

9. AC current means "Alternating Current". DC means "Direct Current".
   A. Which graph at the right show AC?
   B. Which graph shows DC?
   C. Look at any device that plugs into a wall socket and figure out if your house uses AC or DC.

   D. Look at a battery. Is it AC or DC?
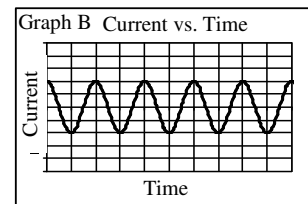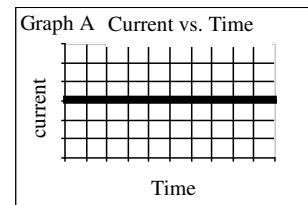
10. An object has a charge of 5.6 µC.
    A) Is it positive or negative?
    B) Did it gain or lose electrons to have this charge?
    C) If a –2µC charge is brought near it, will they attract or repel each other?
    D) As they are brought closer to each other, does the potential energy between them increase or decrease? (*Think of it like a spring.*)