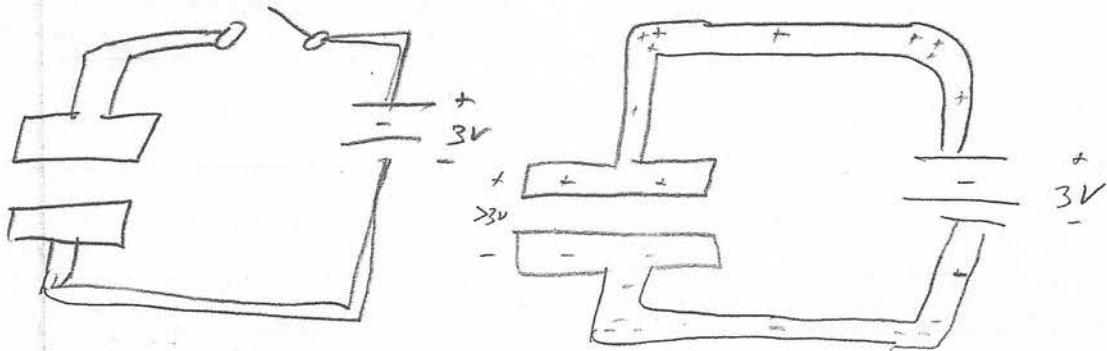


6/27/11

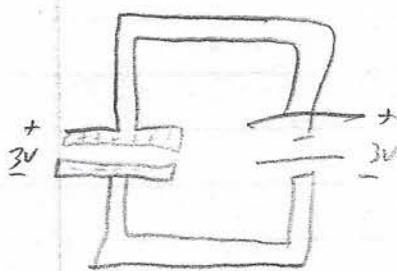
• Capacitors.

Learned that as a capacitor charges, the net potential decreases to 0. This is because a capacitor in series gains a potential opposite of the battery & stops once equal to the battery or fully charged. Once the capacitor is charged, & the net potential is 0, there is no flow of electrons, so the bulb is ~~a~~ <sup>no</sup> longer lights. The bulb dims as the capacitor gains potential because the voltage in the circuit is decreasing ~~at the same time~~.

Just after connecting:



After some time

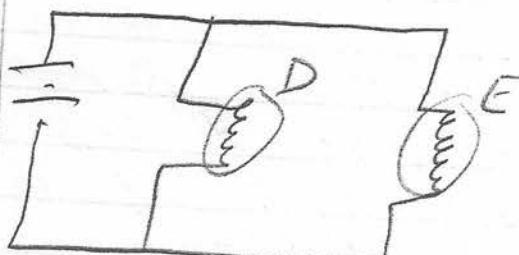
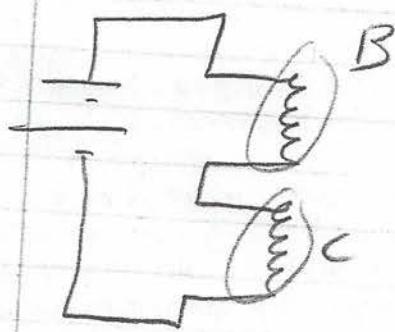
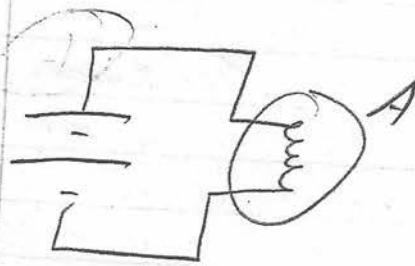


$$\text{net potential} = 3V - 3V = 0$$

Q. How does a capacitor behave in a parallel circuit?

- Water Analogies!
- Light bulbs!
- Resistance!
- Bulbs brightnesses in series/parallel

10/29/11

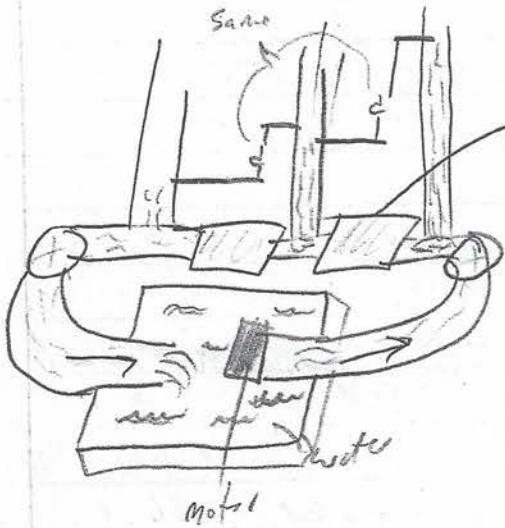


We originally guessed, based only on our intuition that  $A > B + C$  because the voltage vs these parallel is half for  $B + C$ . But then we started... thinking. And we got to thinking that the current flow through  $B + C$  would be the same as  $A$ , therefore the same brightness, &  $D + E$  will have less current flow & less brightness.

Our first guess was right. Not only did  $D + E$  have the same brightness, but the same I.  $B + C$  had less potential drop across each & less I. What we did not expect was the resistance of the bulbs to change when in series.

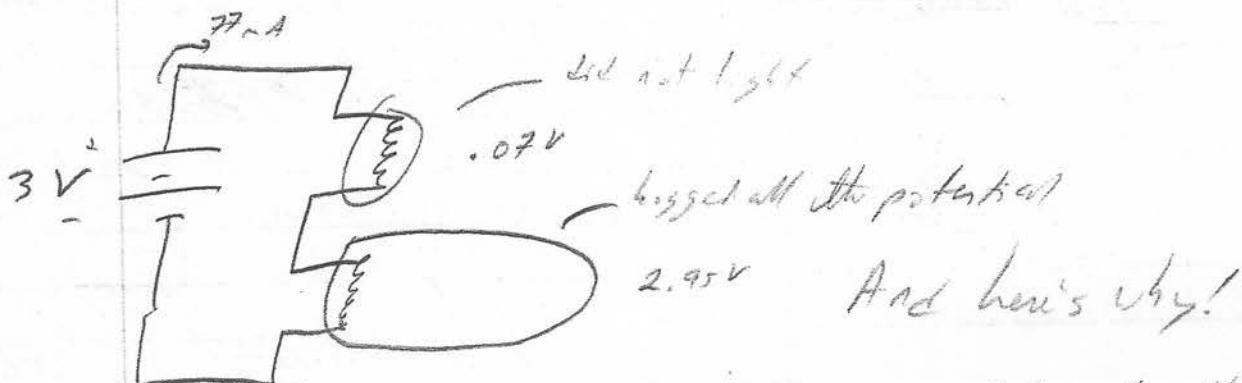
Q: Why do the bulb resistances change?

Water analogies!

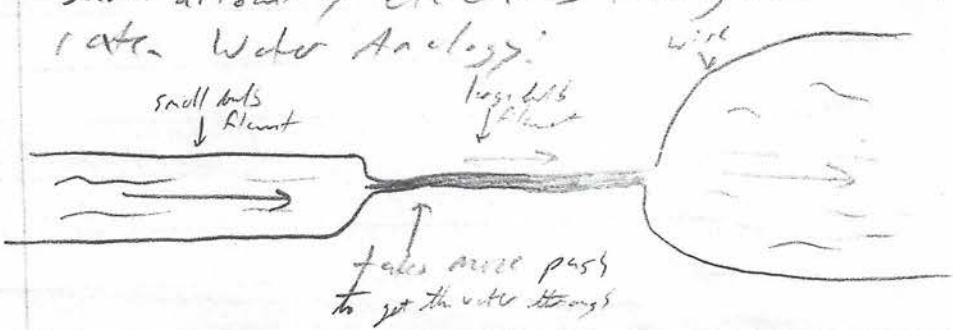


Even though there are 2 different spots of resistance, the water entering must equal the water leaving. The tubes represent voltages. Over the three outer wires in the last 2 tubes, the difference is the same.

Q: shouldn't the last tube have no water?



The filament of the small bulb... much thicker than the long bulb, causing much less resistance than the long bulb. Since the current is the same for both, the longer bulb takes more potential to move the same amount of electrons through it at the same rate. Water Analogy:



Q: If we added more source potential, would we get the small bulb to light?

### In class observations

If wires don't have negligible resistance, then the wires will heat up and potentially start a fire. Using bulbs that have larger resistances make the resistance of the wires to become more negligible.

Q: Why do the same bulbs in a series have less resistance than the same bulbs in parallel circuits?

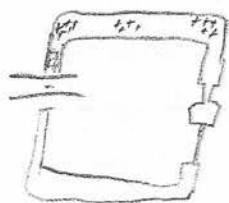
Potential drop across each bulb in a series is the same. The more bulbs you add, the less the drop in potential. The more bulbs that you add to a series circuit, each bulb will have less resistance. When the resistance of the bulbs is much less than the resistance of the wire, the parallel circuit is "abnormal." The distance of the bulb from the battery makes a difference on its brightness because of the resistance of the wire. The wire, since it has the most resistance, will heat up. Current is like water moving through a pipe. The water entering must equal the water leaving. Through the first pipe sponge is more water entering it than entering the second sponge, but there is also more water leaving the first sponge than the second sponge. What matters is the difference between water entering and leaving, the drop of potential. The difference between water entering a leaving each sponge is the same.

10/26/11

### Circuit Charge Model

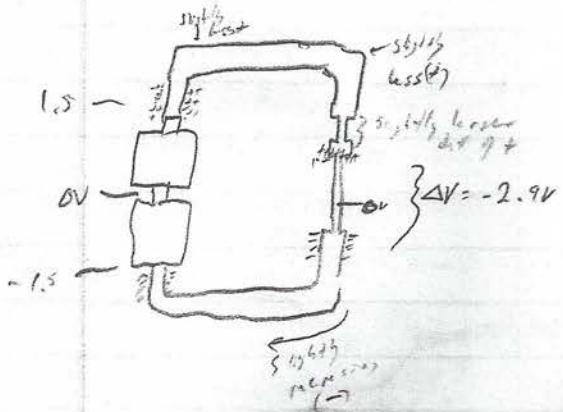
Charge as ~~at the~~ represents the amount of protons in the circuit at any point of time.

I learned that, even though charges pile up at the corners, ~~the~~ the charge difference through the wire must still be greatest from high to low in order for there to be an E-field constant throughout.



on original add bad those built yes, causing E-fields to reverse. We find the correct way is to break off one of the corners because the wire has little resistance, it really has very little change in charge density throughout, although it does, because there is an E-field.

Next we're to find who the charges start from pos. At neg. With 0V in the middle of that stage, the charge drops to 0 on the circuit somewhere in the ring other than because it is very most of the positioned & closely in line with the battery.

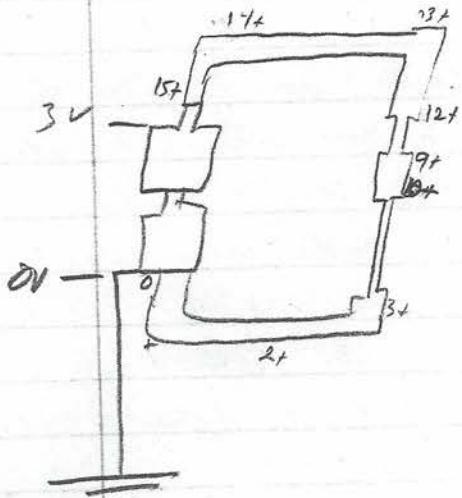


Q. Can we calculate when is the filament V=0, & what ~~is the~~ is the use of knowledge?

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- Dual nodes (cont.)
- Relaxation oscillator.
- Self-sustaining heated glass

I gave up on trying to fix the nod of the 2 lightbulbs w/ a  $\Delta$  on the width of the long filament & neg. charges at the T junction took too long to create the E-field of a battery. I wonder how long it would take to create a series of neg. charges? Set the O at the neg end of the battery. How can we show that not the O has ground?

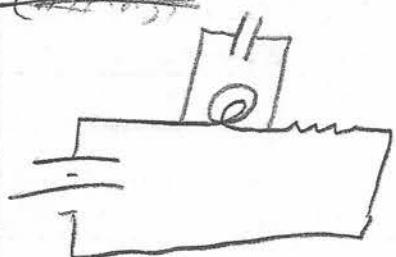


So now, any charges made to the circuit, that point will always be OV. That's because there is a voltage there, or charge, and it will cause a current to run through the ground wire to the ground, making that point 0 once again because the earth is a giant conductor! On p. 12, notice, Absorb all excess charge. Which, in a functioning circuit, there isn't enough the wire remains nevertheless until a malfunction. So now we can see work on all pos. charges which gradually decrease in the wire. Decrease greater over the small filament & almost completely depleted over the long filament. If we move the ground. It establishes a new OV location. Charges flow through the ground wire quickly & the circuit restarts itself. This function is just

as before. The charge is incredibly quick and does not change the circuit at all, just the point where we measure ~~potential difference~~ the charge differences. Acts as a reference point.

Fri. I was always wondering why we included a ground node circuit up in my circuits class, and now I know it is necessary inclusion for our calculations. And I also now know how to look off if the ground moves, how to set up my calculations differently.

(~~Afternoons~~)



I was wondering how the capacitor acts as a load block since when we set up a capacitor to a supply it just discharges until the capacitor is fully charged & then the circuit reaches an electrostatic equilibrium until we charged the connection we were in series. The capacitors in parallel however discharges its charge once full. I think. I'm not sure what I learned though was more capacitance, store energy via resistance (parallel) faster blocks.

Q: I don't quite understand how the capacitor is functioning in parallel or how the resistance gets added in parallel, doesn't that decrease the resistance total?

self-sustaining glass thing. The glass in fact can conduct electrons. When heated up to a point the glass becomes a conductor, the glass will remain hot once conducting because of the current of e<sup>-</sup>'s flowing through it keeping it hot. (Right?)

Glass is highly resistive. Usually an insulator. So why the electrons do flow through it gets hot very hot. ~~This is because~~ e<sup>-</sup>'s flowing through the hot glass keep the glass hot & not f. It just increases the heat and power is in the flow of these tiny e<sup>-</sup>'s released. ~~Heated~~ released by ~~these~~ ~~down~~ ~~tiny~~ ~~things~~ ~~flow~~.

Q: Why can the e<sup>-</sup>'s flow through the glass when super-heated? I think I need the point.

- Do we never want to have this in use? Like using a super-heated insulator that can then become self-conducting? If so, when? And is it even though maybe useful to use, the danger of using it outweigh its benefits?