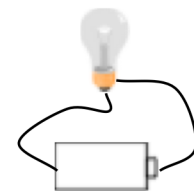


## Homework #2 – Due 2/4 beginning of class

If you have any questions about the homework, feel free to email me: sawtelle@umd.edu

### 1) Revise What's Going on in Circuits

I'd like you to revise your essay from homework #1. Feel free to change your argument slightly as a result of the discussions that we had in class, but do try to answer the questions I posed to you in my comments. Remember the goal is to create an explanation or a story for what's happening inside the circuit with a battery and a bulb. Start me at one point at the bulb and work me through the circuit. One of the key questions I would like you to address is, "What makes the lightbulb light up?" Also, don't be afraid to go out on a limb with stuff you think might be happening. Some people call this "shopping for ideas." What are the various things you might be able to think about here?



(Editor's note: I don't want to imply by asking you to revise that there were not good essays out there. Rather, science is a process of refining our ideas based on new evidence and observations. I'm giving you an opportunity to use what you've observed in class the last couple of days to edit what you originally thought, or now that we've had some more time to explore, this is a chance to really get your idea out on the page.)

### 2) Conductors?

In class we explored a lot about what kinds of things besides wires could be put into a circuit and would still light the bulb. Something we found made the bulb light brightly, such as paper clips, iPhones, and keys. Other things did not let the bulb light including "coated" keys, a bobby pin, and a plastic rule. Someone also tried the lead from their pencil and found that this made the bulb light, but not as brightly. Someone suggested the word "conductor" to describe these things, and on Wednesday we started talking about good and bad conductors. I'd like you to take a moment here to propose a definition for a conductor. Think about your explanation for why the bulb lights and the story of the circuit. What do you think is a good definition of a conductor? What would make one item a "good" conductor and another a "not good" conductor?

### 3) More bulbs!

The class has been converging around two different theories about what's going inside of the circuits:

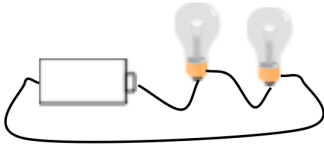
Vibration – The wires and metal in a circuit are full of electrons all the time and when you hook a battery to them they start vibrating, which causes the bulb to light.

Flowing stuff – The battery pushed something out (energy? Particles? Electrons?) and into the wires, and the wires transport it around the circle to light the bulb.

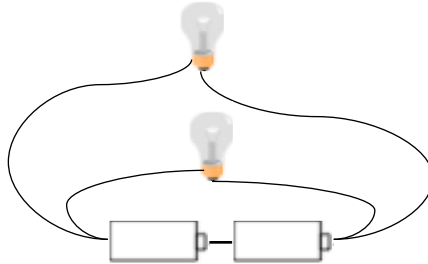
In class on Tuesday, two groups of students made a rule on their whiteboards that said more bulbs make dimmer lights. I would like for you to consider the following arrangements for two bulbs, and using one of the models from above (I don't care which!) explain what would happen in each of the different set-ups. In each set up be sure to tell me

(a) What do you think would happen? Would both bulbs light? Neither? Would one be brighter than the other? (b) Give a competing possibility and the reasoning someone would give to support that. (c) Say what you think doesn't work about the thinking from part (b).

**Arrangement A:**



**Arrangement B:**



**Arrangement C:**

