Phys 115: Inquiry Into Physics	**Ninth Assignment, due Monday, Nov. 12th**
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Problem 1: Consider the following circuit:

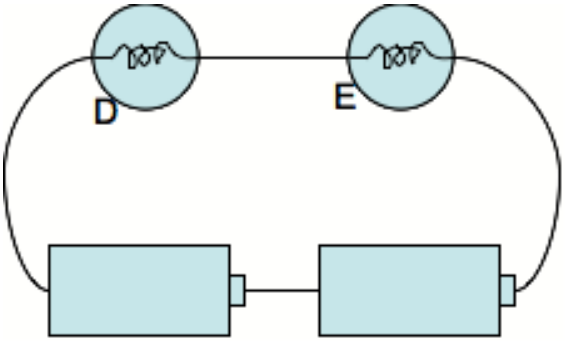

Figure 1

Suppose a student made the following argument about the brightness of the bulbs:

> The bulbs D and E should be brighter than a simple circuit with one bulb and one battery (bulb A). Here we have two batteries connected together; so the moment you complete the connection, each battery sends out an equal number of electrons as in the case of bulb A, i.e., in the wire just before bulb D there are twice the number of electrons compared to bulb A. These electrons would have to go through each of the bulbs D and E. Since twice the number of electrons (due to two batteries) go through each bulb, so they would each be twice as bright as bulb A. The batteries continuously send out electrons and so D and E remain lit at twice the brightness of A.

A) Now you have observed in class that C and D are each as bright as A (recall: A was the bulb with one-bulb, one-battery circuit), not any brighter. Now that you have had a lecture on how physicists think about circuits, provide a reasoning to explain the observation that C and D are equally bright and are each as bright as A.

B) **Second, I want you to write a response to the student.** Remember, the idea is to respond to her argument – not re-state

the alternative explanation for the observation. What specific portion of her argument do you think is problematic? Explain specifically what you think is incorrect about that idea.

2: Conductors and Insulators:

We talked briefly about this on Wednesday (i.e., today). We had defined conductors as materials that allow the flow of electrons through them. We had said that metals are conductors. Now there are also materials such as plastic that do not allow electric current to flow through them. So if you connect the bulb to the battery using plastic wires, it would not light. These materials such as plastic or glass are called insulators.

Based on the lecture on Wednesday, what do you think makes a material an insulator or a conductor. Provide a electron-level picture of conductors and insulators, as best as you can (by electron-level, I mean the regular idea of figuring out what is going on with electrons: magic-school bus style!). As usual, a picture speaks a thousand words and I encourage you to draw a picture to illustrate what you are thinking of (all this picture business really is – what is the image that you have in mind – figure that out and put it down on paper with proper labeling so that someone else could understand it).

3. Question 3:

It is quite possible that the lecture on Wednesday did not really do much in clearing up your confusions, Pick one idea that is still unclear to you. Describe the situation and write down clearly what your confusion is.

Alternatively, you could pick one idea that you think you have a better understanding of after the lecture on Wednesday. Tell me about that idea: what were you thinking before and what are you thinking now, after the lecture. If you think that the lecture finally made you understand the idea better, your essay should reflect exactly how.