

Phys 115: Inquiry Into Physics	<b>Eighth Assignment, due Monday Oct. 29<sup>nd</sup></b>
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**Question 1: Collecting all the observation together and making sense of it.**

There is only one question in this assignment. This is a big question – and it might involve quite some thinking time before you actually start typing. Read the question very carefully.

We have made lots of observations in class in the past two weeks. We have also had conversations about individual circuits and how they might work. We have come to rely more and more on the one-flow model (as Rebecca said that among all models, one-flow seemed to have the most supporting evidence) but yet we have things to fix within the one-flow model: what makes the bulb light, what is the job of the battery, what is the stuff that is going through the wires, why is the bulb brighter in some cases, what happens as you hook up two batteries end to end, or in a different way so that they are independent – and as we talked about in class these are not un-related questions.

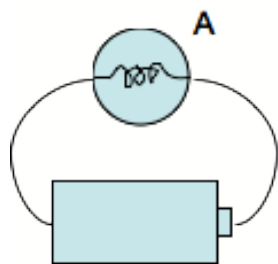


Fig.1: 1Bulb, 1Battery

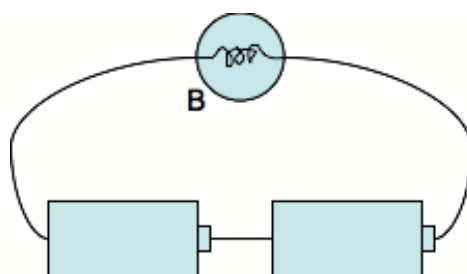


Fig 2: 1Bulb, 2Battery

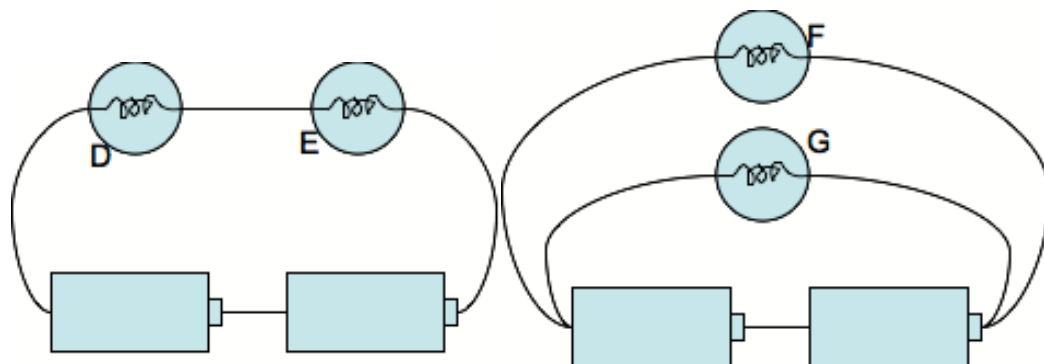


Fig 3. 2Battery 2Bulb

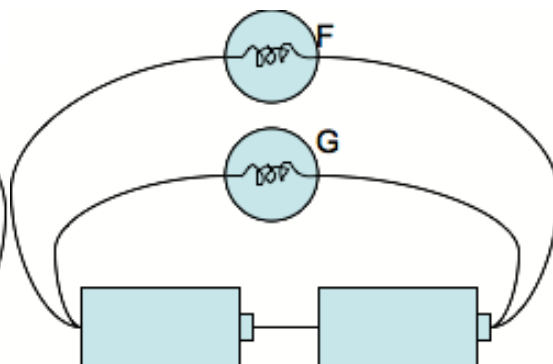


Fig 4: 2Battery, 2Bulb-independent

I want you to specifically consider the following 4 circuits that we have tested in the last 3 weeks. Our observations reveal that some bulbs were brighter/dimmer than others and we want to construct an explanation for what

might be going on. **In every case, draw a picture that illustrates your ideas. (you could also cut-paste the picture from the question and then draw on it with a pen/pencil if that helps you)**

Step 1: what do you think is going on in the circuit in figure one – our simple basic circuit with one bulb and one battery: what is flowing through the wire, what happens at the bulb, what is the job of the battery? You have had to answer this in previous assignment, but we also have had many more discussions since then, so things might have changed.

Step 2: In figure 2, I added another battery and we observed that bulb B is brighter than A. How would you extend your explanation in Step 2 to explain this observation? As usual, be clear and complete (as we have talked about). Be especially clear about what makes the bulb brighter. There might be bits of reasoning that you cannot completely explain – that's fine, but tell me where are these gaps in your explanation for circuit in figure 2.

Step 3. What are the implications of your explanation-so-far for the circuit in figure3? At this point think only about what your idea implies; don't worry about the actual observation.

Step 4. We observed that bulb C and D were equally bright; and that they were less bright than bulb B. Now if your explanation in Step 3 does not match the observation, then how can you modify the explanation in some way, so that it would account for this observation?

Step 5. If you made a modification to your idea in Step 4, then think about what are the implication of the modified idea on figures 1 and 2 (once again focus only on what the modified idea says about the figures 1 and 2). Are the implications still in tune with the observations for circuits in Fig.1 and fig. 2?

Step 6. If the implications of the modified idea do not match observations for Fig. 1 and 2, then would you like to offer a different modification for Step 4? It's okay not to have a modification that explains all figures 1, 2, and 3 – but I wanted you to think about it. Just be clear about what it does and does not explain.

Step 7. Now extend our explanation to the circuit in figure 4, where we have two batteries and two bulbs, differently connected– I think someone said that the bulbs are *independent*. What are the implications of our idea for that circuit? Does it match the observation (F and G are both equally bright as B, and more bright than C or D)? If not, then can you suggest a modification that would help understand that circuit. How does the modification now affect the previous explanations?

It is quite possible that you cannot construct an explanation for all of the circuits, and sometimes modifications that you introduce might have problematic implications for the circuits that you had previously explained. That is okay but I want you to be aware of those implications; I want you to pay attention to what your idea does explain and what it does not; and where in your idea might be links/mechanisms that might be missing.