

# Context for Quiz A Module 5

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The questions in this quiz will be based off of the following scenario:

You have a system of four identical lightbulbs (A, B, C, D), three switches (1, 2 and 3), one battery, and one capacitor. All the circuitry for this system is contained in a black box, and you want to figure out how everything is connected. You perform the following experiments and record your observations.

**You begin each numbered experiment (1a, 2a, 3, 4) with all three switches open.**

Experiment 1a: You close switch 1 and notice that bulbs B and C turn on and have equal brightness.

Experiment 1b: You disconnect bulb B and notice that bulb C turns off. You then reconnect bulb B and bulb C turns on.

Experiment 2a: You close switch 2 and notice that bulb A turns on.

Experiment 2b: You close switch 3 (leaving 2 closed) and notice bulb D turns on and then gradually becomes dimmer, while there is no change in brightness in bulb A.

Experiment 2c: You open switch 2 (leaving 3 closed). The brightness of bulb A halves nearly instantly and bulb D turns on, and then both bulbs gradually become dimmer until they are both off. While they are dimming, both bulbs have equal brightness.

Experiment 3: You close switches 1 and 2. You notice that bulb A is brighter than bulb B and bulb C.

Experiment 4: You close all 3 switches simultaneously. All four bulbs turn on immediately after you close the switches, and you notice bulbs A and D are initially equally bright, and brighter than bulbs B and C. However bulb D gradually becomes dimmer and dimmer until it goes off, while the brightness of each of the bulbs A, B, and C remains constant.

## Logistics:

The quiz will open on March 24 at 11:35am and end 25 minutes after you start, or at 12:05pm, whichever comes *first*. (All times are Toronto time.) It thus comes after Quiz B for Module 4. It will appear on Quercus as an assignment called "Quiz 5a" under "Module 5".

The quiz will consist of 6 questions: 5 conceptual questions and 1 quantitative question. You will see one question at a time, and you may return to a question after you have answered it. You may also ask questions about wording by posting to instructors on Piazza during the quiz. After completing all 6 questions you must click **Submit Quiz** before the time has ended. The time allocation is 4 minutes per question.