# Lab 12: Series and Parallel Circuits

Note: In this lab you will be using a battery to light two lightbulbs. To prevent the battery from being rundown all the way, do not leave your circuit connected longer than necessary.

1. Pictured below are two circuits showing a single battery (in a battery holder) and one or two bulbs (in sockets) connected together to make a circuit. Two bulbs connected the way they are in Circuit II are said to be in *series*.
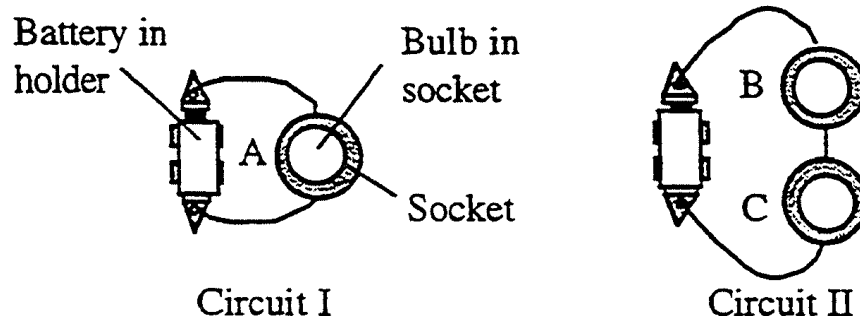
Circuit I   Circuit II

   (a) *Imagine* that you had both circuits in front of you on the table. *Predict* the relative brightness of each of the bulbs and explain your answers below each one.

   Bulb B will be _____ bulb A

   Bulb C will be _____ bulb A
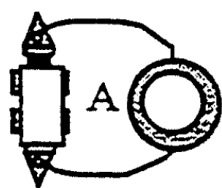
   Bulb C will be _____ bulb B

2. Now you will test your predictions. Set up each of the circuits, making sure each of your lightbulbs are about the same brightness when connected to the battery by itself. You are looking for large differences in brightness, not small differences that could be explained by the fact that the bulbs are not actually identical.

   Bulb B is _____ bulb A

   Bulb C is _____ bulb A

   Bulb C is _____ bulb B

(a) Your instructor should have talked to you about *current.* Based on what they said, what can you say about the current through Circuit I compared to the current through Circuit II?

(b) What does that mean about the current passing through bulbs B and C, which are in series?

(c) Is your answer to the previous question consistent with the idea that current is "used up" in the first bulb, or should the amount of flow be the same through both bulbs?

3. Pictured below are two circuits showing a single battery and one or two bulbs connected in a circuit. Two bulbs connected the way they are in circuit III are said to be in *parallel*
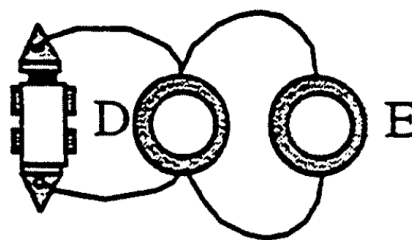
Circuit I   Circuit III

(a) *Imagine* that you had both circuits in front of you on the table. *Predict* the relative brightness of each of the bulbs and explain your answers below each one.

Bulb D will be ——————————— bulb A

Bulb E will be ——————————— bulb A

Bulb D will be ——————————— bulb E

4. Now you will test your predictions. Set up each of the circuits, again making sure each of your lightbulbs are about the same brightness when connected to the battery by itself. You are looking for large differences in brightness, not small differences that could be explained by the fact that the bulbs are not actually identical.
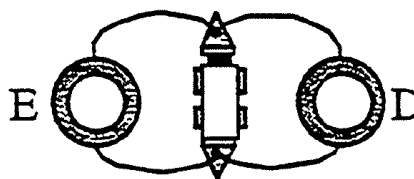
   Bulb D is ———————————— bulb A

   Bulb E is ———————————— bulb A

   Bulb D is ———————————— bulb E

5. Shown below are two different ways to connect two bulbs in parallel.
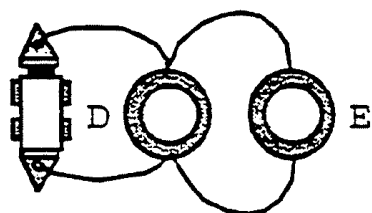
   Circuit III   Circuit IV

   (a) *Predict* if the bulb brightnesses in Circuit IV will be the same or different than that of Circuit III.

   (b) Set up the two circuits and test your prediction. Discuss the results below.

   (c) Use the parallel circuits you have been shown to describe the current flow around parallel circuits. What do your observations about bulb brightness suggest about the way the current through the battery divides and recombines at the junctions where the circuit splits into the two parallel branches?

   (d) What do your observations about bulb brightness suggest about the relative amounts of current through the battery in a single bulb circuit (Circuit I) and in a circuit in which two identical bulbs are connected in parallel across the battery (Circuit III or IV)?