

First to Light Lab

Teacher's Guide

Topic:

Electric Circuits

The following information is provided to the student:

Question:

Which light within a simple electric circuit is the first to light? Is it the light closest to the positive terminal? ... closest to the negative terminal? ... or do all lights seem to light at the same time?

Purpose:

To determine which light bulb (if any) within a 2- or a 3-bulb circuit is the first to light.

A complete lab write-up includes a Title, a Purpose, a Data section, and a Conclusion. The Data section should include a diagram of the 2- or the 3-bulb circuit and some clearly documented observations. The observations should be pertinent to the Purpose. The Conclusion should (as always) answer the *question* posed in the Purpose of the lab.

Materials Required:

Two or three D-cells; battery holder; alligator leads; small ~3 V bulbs (or similar bulb); bulb bases.

Description of Procedure:

Students arrange a circuit with two or three bulbs. They then open and close the circuit by disconnecting a wire at one of its ends. They do their best to determine if they are able to notice a difference in lighting time for the bulb. They repeat the process for several of the wires in an attempt to identify an answer to the question posed in the Purpose.

Alternative Materials and Procedure:

As a demonstration, consider stretching a long strand of Christmas tree lights (or a couple of connected strands) around the room. It is convenient if the last bulb of the last strand and the first bulb of the first strand are next to each other. Then turn the lights on and off and ask students if there is a noticeable difference in lighting times.

Safety Concern:

There is always a higher than usual level of risk associated with working in a science lab. Teachers should be aware of this and take the necessary precautions to insure that the working environment is as safe as possible. Student *horseplay* and off-task behaviors should not be tolerated.

Suggestions, Precautions, Notes:

1. This is a very short lab which can likely be completed in the same day as the Sparky the Electrician Lab.
2. Consider pooling class conclusions. Draw a three bulb circuit on the board; identify the + terminal of the battery and label each bulb as A, B, and C. Then ask students to commit to one of the following conclusions:

The Laboratory

- Bulb A was the first bulb to light.
 - Bulb B was the first bulb to light.
 - Bulb C was the first bulb to light.
 - There is no noticeable difference in lighting times for the three bulbs.
3. This activity is the first of many which can be used to begin building a proper model of charge flow in circuits. Be aware that students enter the class with preconceptions which will have to be directly challenged in order to be dispelled. Ask students to reflect on what they believe and why they believe it. A page at The Physics Classroom Tutorial may serve useful in encouraging students to reflect on their beliefs: <http://www.physicsclassroom.com/Class/circuits/u912d.cfm>.

Auxiliary Materials:

None

Scoring Rubric:

C2. First to Light Lab	Score
<p>___ Included, labeled and organized all parts of the lab report.</p> <p>___ Data section includes a clearly labeled diagram of the simple circuit and documents the observations made during testing. Observations are pertinent to the Purpose.</p> <p>___ Conclusion answers the <i>question</i> posed in the Purpose; <i>answer</i> is correct and consistent with the Data section.</p>	<p>___/___</p>

Connections to The Physics Classroom Tutorial:

The following readings are a suitable accompaniment to this lab:

<http://www.physicsclassroom.com/Class/circuits/u912a.cfm>

<http://www.physicsclassroom.com/Class/circuits/u912b.cfm>

<http://www.physicsclassroom.com/Class/circuits/u912d.cfm>

Connections to Minds on Physics Internet Modules:

Sublevel 1 of the Electric Circuits module is a suitable accompaniment to this lab:

<http://www.physicsclassroom.com/mop/module.cfm>