

Which Path Do I Take?

Prediction: You walk into your bedroom; hit the light switch and the two lights that normally go on do not. You yell at your mother to check the fuse. She yells back that it is okay. What are the possibilities? (Assume that your switch is working fine.)

Which Path Do I Take?

Materials:

- 2 D-cell batteries and holders
- 2 3 volt lamps and holders
- 1 Knife switch
- 6 to 8 patch wires with alligator clips
- Lab Pro with voltage probe and current probe

Goal: At the end of this exercise, you will be able:

1. To devise a circuit that will light both bulbs simultaneously
2. To trace the path that an electron would take in the circuit
3. To draw a schematic diagram of the circuit

Warm-up Activity

Place the batteries, lamps, switch and wires on the desk in front of you. In the space below draw a diagram of a circuit you believe will cause both lamps to light up when the switch is closed.

Using your picture a guide, connect your circuit. Do both lights light up?

On your picture above, trace the path of an electron.

Compare your circuit with other groups in the class. Are there any circuits that are different from yours? How can you prove that the circuit is different? In the space below draw a picture of this circuit and trace the path of an electron.

How many electron paths are in your original circuit?

How many electron paths are in the second circuit?

A series circuit is one in which the electrons have only a single path that they can follow. A parallel circuit is one where the electrons have a choice between two or more paths. Which type of circuit is your original circuit? How do you know?

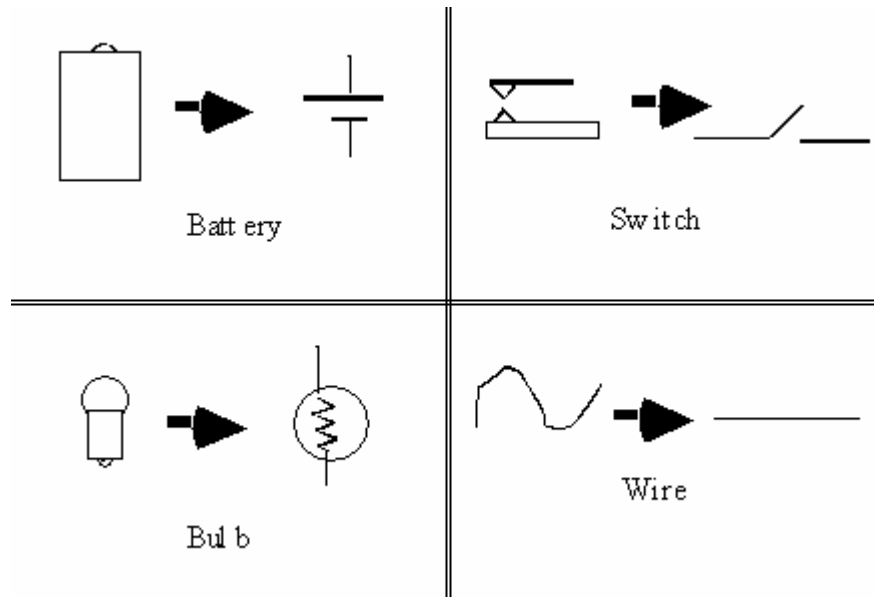
What happens when one of the lights is loosened in each circuit?

Parallel:

Series:

Predict: What are the advantages and disadvantages of each circuit?

Here are the common symbols for the devices you have used today. Using the schematic symbols, convert your two pictures. Be sure to label each circuit as to type.



Extensions:

A. Christmas Tree Lights: Suppose you want to light up your Christmas tree with three bulbs. Figure out a way to wire in all three bulbs so that the other two will still be lit if any one of the bulbs burns out. (Don't break the bulb! You can simulate failure by loosening a bulb in its socket.)

B. Lighting a Tunnel: The bulbs and switches must be arranged so that a person walking through a tunnel can turn on a lamp for a part of the tunnel and then turn on a second lamp in such a way that the first one turns off automatically.

C. Caller Indicator for the Deaf: A deaf person should be able to see, by looking at one or two bulbs, whether a visitor is at the front or back door of the house.