

Circuit Cities: Parallel and Serial

At some time in your science experience, you have designed a simple circuit with a light bulb and a battery. The task was to light the bulb. You might have included a switch in one of the trials you completed. This lab "picks up" where that other lab ended. Be sure you read the item "Electricity: Electrons in Motion" before you try this activity.

Procedure

1. Form groups as instructed.
2. Come to consensus on the terms *parallel circuit* and *series circuit* before proceeding.
3. Write your group definitions to both terms in step 2 on your individual answer sheets.
4. Take your definitions to your teacher for signature or stamp of approval.
5. Return to your lab station and begin task 1.

Task 1

- 1.1. Draw a diagram of a two-light bulb **series** circuit on your individual answer sheet. Label each part of the circuit.
- 1.2. Make a list of equipment needed for this circuit.
- 1.3. Take your diagram and list to your teacher for signature or stamp of approval.
- 1.4. Pick up the equipment you need and return to your lab station.
- 1.5. Build your series circuit.
- 1.6. If both bulbs light, **answer the questions A-C**. If both bulbs do not light, "trouble shoot" the circuit. Make adjustments to the circuit until both bulbs light. Then **answer questions A-C**.

Task 2

- 2.1. Draw a diagram of a two-light bulb parallel circuit on your individual answer sheet. Label each part of the circuit.
- 2.2. Make a list of equipment needed for this circuit.
- 2.3. Take your diagram and list to your teacher for signature or stamp of approval.
- 2.4. Pick up any additional equipment you need and return to your lab station.
- 2.5. Build your parallel circuit.
- 2.6. If both bulbs light, **answer the questions D-F**. If both bulbs do not light, "trouble shoot" the circuit. Make adjustments to the circuit until both bulbs light. Then **answer questions D-F**.

Task 3

- 3.1. Obtain a "special" bulb from your teacher. This bulb is rated at about 4.5 volts.
- 3.2. Use the equipment you have and build a simple circuit to light the bulb.
- 3.3. When the bulb lights, **answer the questions G-I**.
- 3.4. Build a circuit that will make the bulb glow more brightly.
- 3.5. When you succeed, contact your teacher. *You will not receive credit for increasing the brightness of the bulb unless you have completed questions G-I beforehand.*

Questions

- A. What happens to the remaining bulb when you remove one bulb from the circuit?
- B. Hook up each bulb singly so that it lights. When the bulbs are connected in series, are they brighter, dimmer, or the same as when connected individually?
- C. Explain what happens to the brightness of light bulbs in a series circuit.
- D. Remove one bulb from the circuit. Describe what happens to the other bulb.
- E. When the bulbs are connected in parallel, are they brighter, dimmer, or the same as when connected individually?
- F. Explain what happens in "E." Use the terms *voltage*, *resistance*, and *amperage* in your explanation.
- G. Draw a diagram of the circuit you built in task 3.
- H. How does the brightness of the bulb compare to the other single bulbs you lit?
- I. Propose a procedure for increasing the brightness of this "special" bulb using only materials from this lab. Defend your proposed procedure with a short paragraph and a diagram. Take this answer to your teacher for approval before continuing with Step 3.4.