

# 15 Electrodynamics

Name \_\_\_\_\_

Lab A: BASIC CIRCUITRY

Inquiry Physics

A continuous flow of electric charge creates an electric "current". The study of moving charges is called electrodynamics. You already know some important information about electricity in motion. You know that electric motors are used in electric appliances such as mixers, vacuum cleaners, pumps, drills, sanders, and saws. Each of those appliances exerts a force over a distance.

Any object that exerts a force over distance is capable of doing \_\_\_\_\_.

You can now deduce that electricity must be a form of \_\_\_\_\_.

## EXPLORATION

ANSWER QUESTIONS WITH COMPLETE SENTENCES

To begin our study of current electricity, we must start with the basics. At your lab station you will find some electric leads (wires with clips on each end for easy attachment), a battery, light bulbs, and light bulb holders.

**Step 1:** Arrange one bulb (without a holder), one battery, and wire **in as many ways as you can** to make the bulb emit light. Sketch each of your arrangements in the space below, including failures as well as successes. Label the sketches of the successes. **Include a drawing of how to light a bulb using only ONE wire.**

1. Describe the similarities among your successful trials. Be specific about where the wires must touch both the bulb and the battery.

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**Step 2:** Use a bulb in a bulb holder (instead of a bare bulb), the battery, and wire. Arrange these **in as many ways as you can** to make the bulb light.

2. What two parts of the bulb does the holder make contact with?

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**Step 3:** Using one battery, light as many bulbs in holders as you can. Sketch each of your *successful* arrangements in the space below.

3. Compare your results to those of other lab groups. You should note that the brightness of a given number of bulbs is affected by the way the wires are connected. Specify below what sort of setup yields the most bright bulbs.

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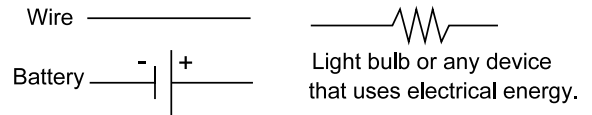


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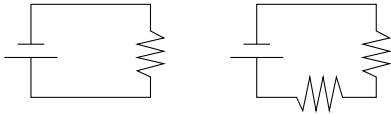
The battery is the source of electric energy and the light bulb is the user. When an electric energy source and an electrical energy user are connected so that electrical energy is used, that hookup is called an *electrical circuit*. Every electrical circuit must have at least one energy source and one energy user. It must also have a way to connect the energy source and the energy user. The connectors, the energy source, and the energy user are the *circuit elements*.

You know that until the circuit elements were connected there was no evidence that energy was being used. The interaction among the elements of an electrical circuit causes an *electric current*. The electric current moves through the circuit elements.

**Step 4:** Diagrams for electric circuits use symbols like the ones shown at right to represent the circuit elements.



Connect the bulbs in holders, the battery, and wire as shown in each circuit diagram shown below. Circuits like these are examples of *series circuits*.



4. How does the brightness of the bulbs in the two circuits differ?

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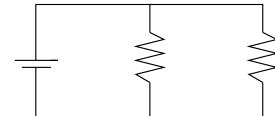


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**Step 5:** In the circuit with two bulbs, unscrew one of the bulbs.

5. What happens to the other bulb? \_\_\_\_\_

**Step 6:** Set up the circuit diagramed at right. A circuit like this is called a *parallel circuit*.



6. Do both bulbs light? \_\_\_\_\_

**Step 7:** Unscrew one of the bulbs in the parallel circuit.

7. What happens to the other bulb? \_\_\_\_\_

8. In your own words, describe the differences between series and parallel circuits. Discuss both their physical differences as well as their behavior when a bulb fails.

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