Traveling Science Shows

THE FRANKLIN INSTITUTE

Pre-Show

ELECTRICITY

About the Show

Electricity is something that we take for granted. We use it all the time, but many of us can't really explain what it is or how we get it. In the Electricity show, we demonstrate how electricity works and some of the major discoveries that helped us harness electricity for our own uses.

Humans first experimented with electricity over two thousand years ago. The ancient Greeks discovered a phenomenon called static electricity, in which the electric charges on two different surfaces are unbalanced. Just over a hundred years ago, people figured out how to use electricity for practical applications. We put electricity to work only after we learned how to make electric charges flow continuously. Once people understood circuits, they were able to invent many of the devices that make life easier on us today. We now depend on the inventions of such pioneers as Alessandro Volta, Hans Oersted, Michael Faraday, and, of course, Thomas Edison.

The following activities are designed to help your students preview some important concepts related to electricity. They will also help your students have some fun with electricity, but please remember to use appropriate safety rules for all activities. The experiment area should be dry. Only use the sources of electricity listed. An adult should always supervise students during experiments.

Thank you for scheduling a Franklin Institute Traveling Science Show.
We are excited to visit you soon!

MAGNET MANIA

GRADES 1-4

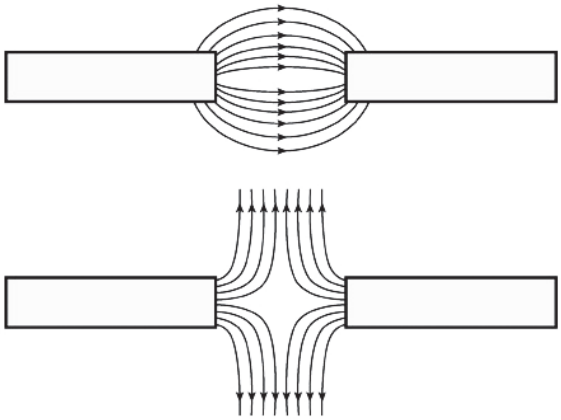
Magnetism has a lot in common with electricity; in fact, the two forces are intimately related. In this activity, students will discover that like poles repel and opposite poles attract – a central concept in the Electricity show. Note: Warn students not to use magnets near computers or televisions.

EQUIPMENT

Bar magnets

Masking tape

Blue and red crayons



PROCEDURE

1. Place masking tape over the ends of bar magnets so that the N-pole and S-pole designations are covered up.
2. Give each group three identical bar magnets with taped ends. Challenge students to determine which ends of the magnets are the same. Students will discover that if the ends of two magnets both attract one end of a third magnet, those two ends are the same.
3. Let students experiment. Have them use the crayons to designate like ends of the three magnets.
4. Once they have found which ends are like and which are unlike, introduce the terms north and south pole. Then ask students to discover a pattern or rule about how like (same) and unlike (opposite) poles interact.

WHY?

All magnets have two poles, designated north and south. Like poles (i.e. north and north) will always repel each other. Unlike poles (i.e. north and south) will attract each other. Hence the saying, "Opposites attract." Challenge students to develop an experiment that tests whether the magnetic force of attraction or repulsion is stronger.

THAT FUZZY FEELING

FOR GRADES 3-6

Static electricity experiments serve as a good introduction to the concept of electrical charges. In this experiment, students will identify materials that can interact electrostatically and demonstrate how static electric forces attract other objects. Note: This experiment works best on a cool, dry day.

EQUIPMENT

Wool fabric
Plastic rod (or a plastic pen)
Confetti
Wooden stick (or a pencil)
Metal rod (any long, straight piece of metal)
Glass rod

PROCEDURE

1. Show students how to take a plastic rod and rub it vigorously with the wool. Bring the rod near confetti. What happens?

2. Ask students what happens when you run your hand over the rod, and bring it near the confetti again. Does it still work? What changed?

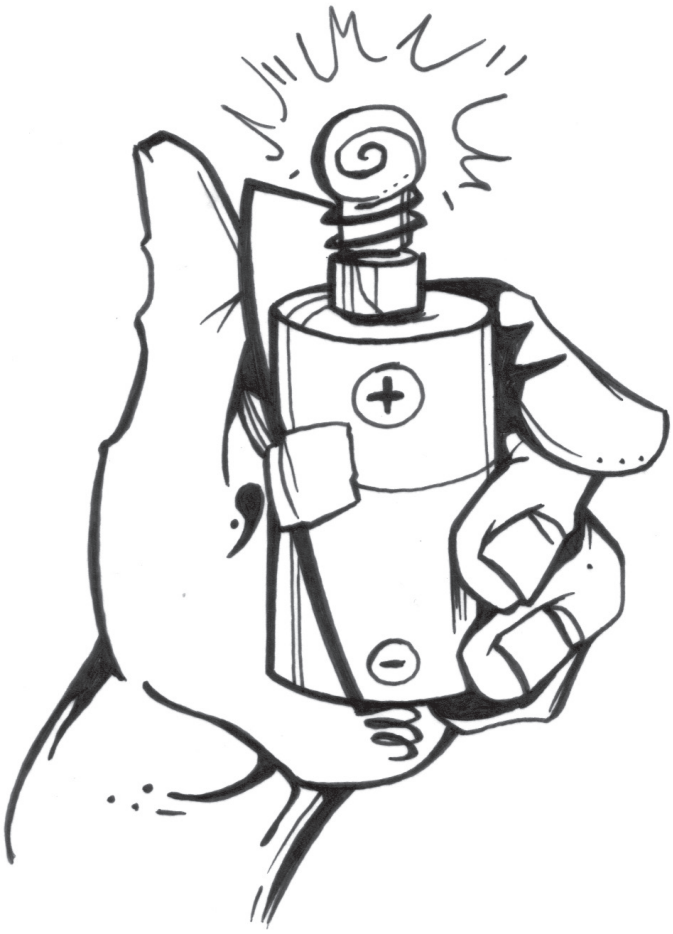
3. Repeat step 1 with the metal rod, the wooden rod, and the glass rod. Which of these works? Why?

WHY?

As we will learn during the show, atoms contain two kinds of charges: positive and negative. They are normally stuck together, and cancel each other out. When we rub two things together, we pull some of these charges (usually negative) off one thing and put them on the other. The charges that are left behind seek out their opposite, and will pull toward any opposite charge they can find. Some things, however, are conductors of electricity. When we put unpaired charges on a conductor (like metal), the charges disperse instead of staying concentrated. Can you think of other examples of static electricity in daily life?

EXPLORING CIRCUITS

GRADES 3-6



In this activity, students will experiment with various circuit configurations to determine how to light a bulb. Familiarity with the basic concept of a circuit will prepare them for the Electricity show, where we will expand on how a circuit works.

EQUIPMENT

One flashlight bulb per student
One 1.5 volt D-cell battery per student
One insulated wire, 15-25 cm, per student

PROCEDURE

1. Give each student a bulb, a length of wire, and a battery. Challenge them to light the bulb.

2. Let the students work individually and take as much time as needed. Resist the temptation to show them how to light the bulb; instead, encourage them to keep trying. As they succeed, students will develop confidence in their own abilities to learn about electricity.

3. As each student succeeds, challenge him or her to find another way to light the bulb.

4. Give each student a second wire, and ask them to use two wires to light the bulb without the bulb touching the battery.

5. Discuss the configurations that worked, and those that didn't. Can you come up with the rules of a successful circuit?

WHY?

Students often mistakenly believe that electricity begins at a source and goes to a target. However, there must be a continuous path through the battery, bulb, and wires. This is called a circuit. Within this path, the bulb must be touched on both the side and the bottom, and the battery must be touched on both ends.