



DON'T RUB ME THE WRONG WAY



BENCHMARK and TASK

SC.B.1.2.2 The student recognizes various forms of energy (e.g., heat, light, and electricity).

- The student experiences the effects of statically charged objects on other objects.

KEY QUESTION

What effect do statically charged objects have on other objects?

BACKGROUND INFORMATION

All matter is made up of tiny particles called **atoms**. Each atom contains 3 basic parts:

Protons, which have a positive electric charge (+)

Electrons, which have a negative electric charge (-)

Neutrons, which have no electric charge

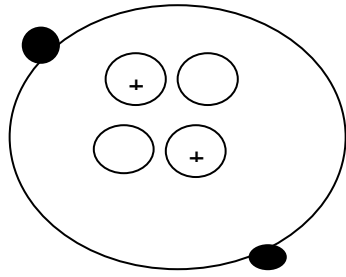
Protons and neutrons are in the nucleus or core of an atom, while the electrons orbit around the nucleus (see drawing #1). Most objects, such as balloons, have about the same number of electrons and protons, making them electrically balanced (see drawing #2).

Friction (rubbing two objects together) causes objects to gain or lose electrons. When this occurs, the object becomes electrically charged. This is called static electricity. If an object gains electrons when it is rubbed, it becomes negatively charged, because it has more electrons (-) than protons (+). If an object loses electrons when it is rubbed, it becomes positively charged because it has more protons (+) than electrons (-).

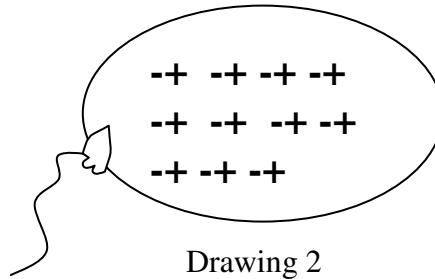
(Note: Atomic structure is very abstract for students. It is enough for them to understand that an electric charge is created. Since there is no way for them to tell whether the charge is negative or positive, simply recognizing that the object has a charge is enough.)

A basic principle of electric charges is that like charges repel and unlike charges attract. When a balloon is rubbed on you hair, it gains electrons from your hair and becomes negatively charged. Your hair becomes positively charged and will stick up because like charges repel. When the negatively charged balloon is brought near your hair, it will be attracted because unlike charges attract.

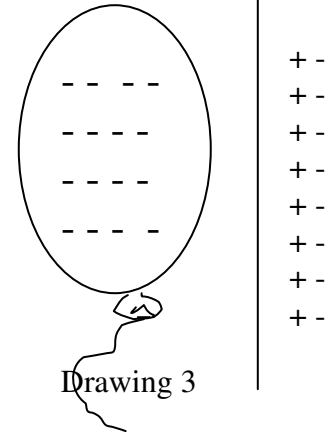
When a negatively charged balloon is brought near a wall, it induces a positive charge near the surface of the wall. (The electrons on the balloon repel electrons near the surface of the wall.) Since opposite charges attract, the balloon clings to the wall (see drawing #3).



Drawing 1



Drawing 2



Drawing 3

MATERIALS

Teacher

2 balloons

tiny pieces of paper

hair dryer (optional)

Discovering Electricity, Natalie Lunis,
Ranger Rick (supports whole unit)

Per group

Don't Rub Me the Wrong Way activity sheet

plastic wrap

paper towels

small objects to be tested: safety pins, salt, small pieces of aluminum foil, Styrofoam packing broken into small pieces, dental floss (not waxed), vermiculite, puffed cereal

TEACHING TIPS

1. This activity works best on cool, dry days or inside an air-conditioned classroom. If humidity is high, blow a hair dryer near the balloon and in the area where the experiments will be done.
2. The type of plastic wrap used may affect the results of the experiment since all brands do not build up the same amount of static charge. Experiment with several brands ahead of time.

ENGAGE

1. Inflate two balloons and tie the ends. (This can be done ahead of time.)
2. Give the balloons to two students and ask them to use the balloons to try to pick up tiny pieces of paper from the floor.
3. Next, have the students rub the inflated balloons several times against their hair or clothing.
4. Ask students to use the balloons to again try to pick up the tiny pieces of paper.
5. Ask: *What happened when you attempted to use the balloon to pick up the pieces of paper before you rubbed the balloon against your hair?*
What happened when you attempted to use the balloon to pick up the pieces of paper after you rubbed the balloon against your hair?

EXPLORE

1. Distribute materials to each group.
2. Ask students to predict what will happen if they charge the plastic wrap and hold it above the objects listed on the activity sheet. Have them record their answers in the blanks provided.
3. Advise students to test one object at a time.

4. Students can charge the plastic wrap by placing it flat on a desk and rubbing it with a paper towel.
5. Two members of the group should lift the charged plastic wrap by the four corners and slowly lower it until it is 6-10 cm above one of the objects to be tested.
6. Students should record the results on the activity sheet.
7. Students should choose additional items to be tested. Each item and the results of the testing should be recorded on the activity sheet.

EXPLAIN

What caused the plastic wrap to stick to the table and other objects when it was rubbed with a paper towel? (Rubbing the plastic wrap created an electric charge that the table and tested objects did not have.)

Once the plastic wrap is charged, why did it pick up some objects, but not others? (The attractive force caused by static electricity was enough to overcome the force of gravity for the lighter objects but not the heavier ones.)

EXTEND/APPLY

1. Ask students to think of times when they observed the effects of statically charged objects on other objects, especially in their homes.
2. Ask students to rub their feet on the carpet and touch the wall. Discuss what happens.
3. Share the book, *Discovering Electricity*, by Natalie Lunis.

EXTENSION

Students can make “magic wands” by rubbing plastic straws or pens with a paper towel. The wands will attract light objects.

ASSESSMENT

Explain what would happen if a positively charged object and a negatively charged object were brought together.

Explain what would happen if two positively charged objects were brought together.

Explain what would happen if two negatively charged objects were brought together.

STUDENT SCIENTISTS: _____

DON'T RUB ME THE WRONG WAY

DIRECTIONS: Choose an object to be tested. Predict whether or not it will be attracted to the plastic wrap. Charge the plastic wrap by placing it flat on the desk and rubbing it with a paper towel. Two team members should lift the charged plastic wrap by the four corners and slowly lower it until it is 6-10 cm above the object to be tested. Observe. Record the results.

MATERIAL TO BE TESTED	PREDICTION (Will the material be attracted to the plastic wrap?)	RESULTS