

# Bay Area Scientists in Schools Presentation Plan

**Lesson Name:** Sticky ballons and static electricity

**Presenter(s):** Margot Paulick

**Grade Level:** 4<sup>th</sup> grade

**Standards Connection(s):** Physical science – matter is made up of atoms; behavior of electrically charged objects

## **Abstract:**

In this lesson, we're going to learn about static electricity. We will first talk a little bit about electricity, matter, and atoms. Atoms are made up of protons and electrons, and the movement of these electrons is what causes electricity. Next, we will do an experiment called "sticky balloons". The students will have a chance to experiment with balloons that they electrically charge by rubbing on their hair. The students will then try to pick up certain materials with their balloons without touching the balloon to the materials. We will then discuss what stuck and what didn't stick to the balloons. Finally, we will discuss how this experiment works thanks to static electricity. If there is time, the students may also try another experiment called "soda can races" where the students will use static electricity to race empty soda cans across the floor.

## **Vocabulary/Definitions:**

- Electricity – energy produced by the movement of electrons
- Atom – very tiny particles that make up matter
- Proton – very tiny particle that makes up part of an atom; has a positive charge
- Electron – very tiny particle that makes up part of an atom; has a negative charge
- Static electricity – a build-up of electrons (electricity) that stays in one place until it jumps to another object

## **Materials:**

I will bring all of the materials needed for the experiments.

The students should have pencils and lots of enthusiasm for science!

## **Classroom Set-up:**

I need a chalk/whiteboard and something to write with. I need the students to be arranged in groups of 4 (4 desks together is fine). I also need some table space and about 10 minutes for set-up and 10 minutes for clean up time.

## Classroom Visit

### **1. Personal Introduction: \_\_\_\_\_ 5 \_\_\_\_\_ Minutes**

I am a recent graduate of UC-Berkeley where I studied chemistry. I am a chemist who also does biology. Most importantly, I am a scientist – I like science. It's a great way to explain stuff that happens in the world around us.

How many of you like science? How many of you have parents who are scientists? Do you know what kind of scientists your parents are?

Today we're going to learn about electricity and do some cool experiments.

### **Topic Introduction: \_\_\_\_\_ 10 \_\_\_\_\_ Minutes**

1. Big box of stuff – what do these things have in common? All of these things involve electricity.
2. Explanation of electricity, matter, atoms, protons, and electrons.

### **2. Learning Experience(s): \_\_\_\_\_ 20-30 \_\_\_\_\_ Minutes**

“Sticky balloon experiment” – see attached worksheets.

### **3. Wrap-up: Sharing Experiences and Building Connections \_\_\_\_\_ 5-10 \_\_\_\_\_ Minutes**

How does the sticky balloon work? Static electricity! We can't see atoms, but we can see how they behave. Opposites attract and like charges repel. When you rub the balloon on your hair, you transfer electrons from your hair to the balloon – now the balloon has a negative charge. When you place this balloon near another object, the electrons (which have a negative charge) in that object “run away” from the electrons in the balloon. The protons (which have a positive charge) in that object are attracted to the balloon, causing the object to stick to the balloon. Some objects, such as Cheerios, weigh too much to be picked up by the balloon – the electrical charge on the balloon is not strong enough to overcome gravity.

### **4. Close: \_\_\_\_\_ 5 \_\_\_\_\_ Minutes**

If time permits, we will also try “soda can races” (see attached sheet). Otherwise, the students can try this experiment at home or during other classroom time. We'll also discuss where we see static electricity in our everyday lives (lightning, shocking ourselves after shuffling our feet on the carpet, socks after coming out of the dryer).

**TOTAL \_\_\_\_\_ 50 – 60 \_\_\_\_\_ Minutes**



**CRS**

**COMMUNITY RESOURCES FOR SCIENCE**  
practical support for great science teaching

1611 San Pablo Avenue, Suite 10 B  
Berkeley, CA 94702

(510) 527-5212 | [www.crscience.org](http://www.crscience.org)

## Follow-up – After Presentation

See attached worksheets.

- 1 – Sticky balloon experiment
- 2 – Sticky balloon write-up
- 3 – Soda can races

Also, for a bunch of other cool static electricity experiments/reading, see

<http://www.sciencemadesimple.com/static.html>

**Static Electricity Series** (Children’s Museum of Houston) – In these hands-on activities, learners explore static electricity through the use of common household products. The activity webpage includes a fun how-to video for learners and educators.

<http://www.cmhoustonblog.org/2011/01/29/static-shock/>

<http://www.cmhoustonblog.org/2011/02/07/static-cling/>

<http://www.cmhoustonblog.org/2011/02/14/static-repulsion/>

<http://www.cmhoustonblog.org/2011/02/17/static-repulsion-bonus-experiment/>

### Reading Connections:

- Electricity by Darlene Lauw - Explains static electricity, magnetism, and how electricity travels. Highlights leading scientists, Earth-friendly facts, and important vocabulary. <http://books.google.com/books/about/Electricity.html?id=fRwJcaLDrcQC>
- Electricity: A Question and Answer Book by Adele Richardson - Have you ever shocked someone after rubbing your feet on the carpet? The shock is electricity jumping from you to another person. Look in this book for a dozen questions that will get you thinking about how electricity powers your world. <http://books.google.com/books/about/Electricity.html?id=uCl8x3qb4LAC>
- Sources of Forces: Science Fun with Force Fields by Vicki Cobb - With this book, you take ordinary objects and test different properties of force fields. Make an electric field detector out of a film can, a plastic drinking straw, tape, and a pencil. Build a device that measures electric current using a compass, a soda can, some string, and some tape. <http://www.amazon.com/Sources-Forces-Science-Force-Fields/dp/0822570238>



**CRS**

**COMMUNITY RESOURCES FOR SCIENCE**  
practical support for great science teaching

1611 San Pablo Avenue, Suite 10 B  
Berkeley, CA 94702

(510) 527-5212 | [www.crs-science.org](http://www.crs-science.org)

## Sticky Balloon – groups of 4 people

### What do we need?

1. 4 balloons (1 per person)
2. 2 pieces of paper
3. a small cup of salt
4. a small cup of pepper
5. a small cup of Cheerios
6. a small cup of puffed rice cereal
7. a small cup of styrofoam (“packing peanuts”)
8. a small cup of birdseed
9. a small cup of gelatin
10. 1 paper plate
11. 1 dryer sheet

### What do we do?

1. Pick one person in your group to be the writer. That person will be in charge of writing down the results from the sticky balloon experiment.
2. Blow up the balloons and tie them off (ask for help if you need it).
3. Have one person in your group tear up 1 sheet of paper into very small pieces and another person in your group to tear up 1 sheet of paper into larger pieces (ask Margot about the sizes). Place into two separate piles on your table or desk.
4. Put the paper plate on the table and place some of the very small pieces of paper on it.
5. Have one person rub his or her balloon back and forth on his or her hair (do this really fast!). Hold the balloon just a few inches away from the very small pieces of paper on the paper plate. Do not let the balloon touch the pieces of paper. What happened? Let everyone in the group try this experiment. Have the writer of the group write down what happened.

6. Repeat the balloon experiment with all of the materials listed on the list. Make sure that everyone has a chance to try to pick up all of the materials. The writer of the group should write down what stuck to the balloon and what did not stick to the balloon.

7. What happens if you rub the balloon on your hair and then rub the dryer sheet on the balloon? Will the balloon still pick up the pieces of paper? Or the Styrofoam? What about the other materials you are testing?

8. What happens if you place a piece of paper between the balloon you rubbed on your hair and the material you are trying to pick up? Will the balloon still stick to the material?

9. When we are all done, we will discuss what stuck to the balloons and what did not. We will also discuss the science behind the sticky balloons.

How do we clean up?

1. Margot and your teacher will come around the room with a paper bag. Please place everything but the balloons in the bag. Don't crush the cups or the paper plates!

Name \_\_\_\_\_

Date \_\_\_\_\_

Material	Stuck to the balloon 	Did not stick to the balloon 
Cheerios		
salt		
pepper		
the wall		
large bits of paper		
small bits of paper		
puffed rice cereal		
birdseed		
styrofoam		
gelatin		
hair on your arm		

## Soda can races – groups of 4 people

What do we need?

1. 4 balloons (1 per person)
2. 2 empty soda cans

What do we do?

1. Blow up the balloons and tie them off (ask for help if you need it).
2. Pick two people to race. Each person gets an empty soda can. Place the cans on their sides on a table or the floor – anyplace that's flat and smooth. Hold them with your finger until they stay still.
3. Have the racers rub the balloons back and forth on their hair really fast.
4. Have the racers hold the balloons about an inch in front of their cans. Don't touch the balloons to the cans! The cans will start to roll, even though the racers are not touching the cans.
5. Move the balloon away from the can – slowly – and the can will follow the balloon.
6. If you move the balloon to the other side of the can, the can will roll in the other direction.
7. How fast can you make the can roll? How far can you roll it before the can stops? Can you make the can roll uphill? Race each other across the desk or across the room.
8. What do you think will happen if you rub the balloon with a dryer sheet after you rub the balloon against your hair? Will you be able to make the can roll using the balloon?
9. How do you think this works? Why do the soda cans roll?