

Bay Area Scientists in Schools Presentation Plan

Lesson Name Having Fun with Magnets

Presenter(s) Sehra Rahmany and Taiki Murakami

Grade Level 4th Standards Connection(s) Physical Science: Magnets, Compasses, and Electromagnets

Teaser:

In this lesson we will learn about magnets, compasses, and electromagnets by playing with balloons and magnets. Students will learn vocabulary terms such as repel, attract, proton, and electron in a "define me game". Additionally students will learn why magnets are important in how electric fields, protons, and electrons are manipulated.

Objective: *Students will learn about how opposite charges attract. Through experimenting with magnets, students will be able to create their own magnetic field and understand the concept of the electron and proton.*

Vocabulary/Definitions:

- 1) Attract: opposite charges pull together.
- 2) Repel: like charges oppose each-other.
- 3) Electron: negatively charged subatomic (inside atom) particle.
- 4) Magnet: an object that attracts certain substances such as iron.
- 5) Proton: positively charged subatomic particle.

Materials:

Each group will be provided the following:

For Magnetic Fields Activity:

- Bar magnets, U magnets, Ceramic magnets
- Magnet Board
- Iron filings

For Static Electricity Activity:

- Balloons
- Furs, silk

Each student should have paper and pencil.

Classroom Set-up:

The lesson will take place in-class, where the students will be divided into groups. Each group will be expected to come up with a team name for the activities.

Classroom Visit

1. Personal Introduction:

5 Minutes

Hello Class, My Name is Sehra Rahmany and I am from UC Berkeley (that big university that looks like Hogwarts out in Berkeley). I am a neuroscience major, which is the study of the brain. As someone who is interested in the brain, I also enjoy playing with magnets and balloons. Reason for our lesson plan on magnets is because as a college student I had previously done an experiment like the one we are doing today and enjoyed it very much. Through enjoyment I learned a lot and decided to make it our lesson for today.

Topic Introduction:

10 Minutes

Students will first be asked to define and describe what magnets are to determine what they already know about electromagnetism. Using their knowledge to build a clear foundation of understanding what the electrons, protons are/ do and which is positively charged, and negatively charged.

2. Learning Experience(s):

35 Minutes

- 1) *My plan is to create a fun way of intriguing the fourth graders with a definition game and then having them set up magnetic fields and play with magnets. The students will be broken up into groups and each group will be given the magnets. Each group will come up with a team name for the activities. The students will learn new terms and also be familiar with magnets, magnetic fields, compasses, and electromagnets. The "define me game" is for the students to easily identify what terms we are using throughout the exercises. The "define me game," is an educational way of playing and learning what the vocabulary terms mean from the lesson. The main purpose of the game is to incorporate the meaning of the terms throughout the lesson. The rules are that there will be students in teams, probably groups of four, and a time limit of a minute to define a term that is written on the board, if no team defines than the instructor will write it on the board. There is no win or lose, it is just for the students to work and learn together.*
- 2) *The second activity gives students the opportunity to play with magnets and see how they attract and repel. From the balloon activity, they will repeat the meaning of electron and proton, and understand how hair loses electrons, while the balloon gains the electrons, thus causing the hair to be positively charged (protons). The balloon activity is for students to use blown up balloons and rub it on their heads to observe what has happened to their hair and the balloon, and why the balloon either attracts or repels from the silk or fur given to their group. Through observation they will define what had happened to their hair, balloon, silk and fur. They will be given materials such as a balloon, fur, and silk to observe static electricity. The balloon activity is meant for students to make a connection with the terms from the previous "define me" game, including their own personal lives.*

3. Wrap-up: Sharing Experiences

5 Minutes

Through sharing and working together in groups, the students will gain knowledge of magnets. Also by working together the students will be more social and involved with the activity. Question to students, have you ever seen your blanket, pants, or shirt that came out of the dryer electrically shock you? This relates to static electricity with the balloon from rubbing it on hair.

4. Connections & Close:

10 Minutes

Think of the whole Earth as a huge magnet because it is filled with negatively and positively charged people that attract one another, like protons and electrons. Students when rubbing the balloon on your head, lose the electrons from their hair. This makes the balloon negatively charged. If you like learning about magnets there will be a follow-up activity I will give your teacher, including a few website pages with activities. Thanks and good-bye!

Total 50 – 60 Minutes

Follow-up – After Presentation

As a follow-up, I would like for the students to continue their journey on magnets with another activity. I hope through the activities shown in today's lesson, they want to discover more about magnets, compasses, and electromagnets. I will be leaving the instructor a picture from an activity with magnets for the students to do. The following website pages have activities that can be done at home or class:

- <http://kids.nationalgeographic.com/kids/activities/funscience/magnet/>
- http://www.physics4kids.com/files/elec_magnets.html

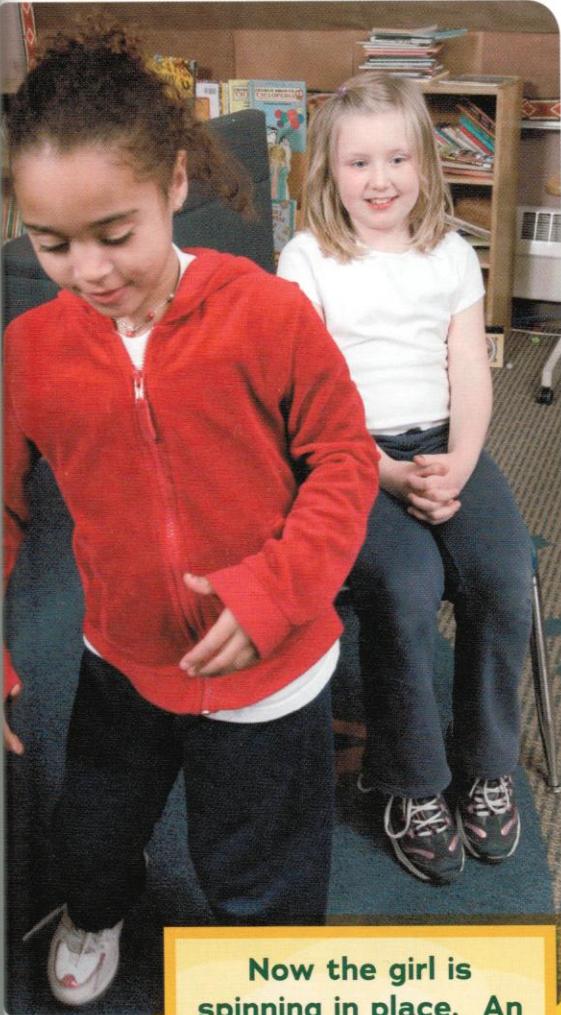
Move Like an Electron

Ask a friend to sit in the middle of the room. Walk in a circle around your friend. You are orbiting your friend.



While an electron is orbiting, it also moves in a second way. Stop walking and stand in place. Spin your body around. An electron spins this way too. Most of a magnet's force comes from electrons spinning inside it.

The girl who is walking is pretending to be an electron. She is moving in a circle around her friend.



Now the girl is spinning in place. An electron spins while it is moving in a circle around a nucleus.

An atom's electrons spin in different directions. Some electrons spin clockwise. The rest spin counterclockwise. Sometimes half of an atom's electrons spin clockwise and half spin counterclockwise. Then the atom has no magnetic force. But if more electrons spin one way than the other, the atom has magnetic force. Atoms that have magnetic force act like tiny magnets.

Exploring Magnets

1. Put two magnets on the paper as shown in each picture.
2. Write what you think will happen when you move them in the directions of the arrows.
3. Write what actually happened.
[Use one of the words in the box for each answer.]

Attract means to pull closer.

Repel means to push away.

1.



A. In this picture I think the magnets will _____.

B. The magnets actually _____ ed.

2.



A. In this picture I think the magnets will _____.

B. The magnets actually _____ ed.

3.



A. In this picture I think the magnets will _____.

B. The magnets actually _____ ed.

In this experiment we learned that;

Poles that are the same _____ and

poles that are different _____.