TRB 5:4 - Activity 1: Static Cling

Summary

Students will learn about static electricity by completing a variety of hands-on activities.

Materials

Kit #1:

- one balloon per student
- small piece of wool
- small tissue paper pieces
- one friction rod
- one metal rod
- plastic spoon
- plastic pen
- plastic or rubber comb
- wooden pencil
- large paper clip
- penny
- iron nail
- key
- plastic sandwich bag string or yarn
- (The items in this kit will be used in future electricity lessons.)

Additional Resources:

Books:

Edison Etc. by B.K. Hixson

Make it Work! Electricity by Alexandra Parsons ISBN:0-590-54461-6

Lightning by Seymour Simon ISBN:0-590-12122-7

Lightning! And Thunderstorms by Mike Graf ISBN:0-689-82018-6

Magazine:

THE MAILBOX • Intermediate •Feb./Mar.1998

Background for Teachers

One type of electricity is called static electricity. It doesn't move, but is attracted to and repelled by the static electricity in other objects. The attraction and repulsion properties of static electricity are not the same properties that magnets possess. Static electricity can best be produced on cool, dry days. Lightning is caused by the movement of positive and negative charges toward one another. During a storm the particles in a cloud become statically charged by the action of the wind blowing them around the cloud. Lightning strikes can happen within a cloud, between two clouds, or between a cloud and the ground. The stronger source of static electricity moves towards the weaker source causing the flash that we see as lightning. "Mini sparks " of lightning can be seen when a person gets "shocked " after walking across a carpeted floor and then touching a T.V. that is turned on. The discharge of static electricity is seen as lightning and heard as thunder on a large scale. It is seen as little sparks and heard as a crackling sound on a small scale. Both are evidence of energy being released.

If friction rods are not available, plastic pens or PVC pipe may be substituted. Also, any wool item can be cut up and used rather than purchasing wool fabric from a store. Donations from the public or second hand stores are possible sources for wool.

Intended Learning Outcomes

1-Use science process and thinking skills.
3-Understand science concepts and principles.
4-Communicate effectively using science language and reasoning.

Instructional Procedures

Invitation to Learn:
Select a volunteer to come to the front of the classroom. Rub the balloon on the volunteer 's head, lifting up the balloon occasionally. Keep doing this until the student 's hair sticks up all over. The balloon can also be "stuck " to the wall. It will stay "stuck " to the wall. Have students make predictions as to why the hair reacted to the balloon in this way, and why the balloon sticks to the wall.
Instructional Procedures:

Explain that opposite charges attract and like charges repel. The balloon has a big negative charge on it through friction from rubbing it on the volunteer 's hair. This has left the hair with a positive charge. The positively charged hair and the negatively charged balloon are attracted to one another because opposite charges attract. When the balloon is taken away, the hair still stands on end somewhat because each strand of hair has a positive charge. The hairs will repel each other because like charges repel. Explain they have just witnessed static electricity. Have students make a technical drawing in their science journals of the hair demonstration. Have them label the charges. Drawing and labeling the teacher as an example would be a good idea to avoid any misunderstandings at this stage of learning.

The positively charged hair is attracted to the negatively charged balloon. Opposite charges attract.

Next demonstrate that like charges repel by doing the following: Tie two inflated balloons to a stick or ruler with string. Charge them by rubbing them on the same sweater or with the same piece of wool. Make sure the charged sides are facing each other. Because both balloons have the same charge they will swing away from each other. Putting an object such as a hand in between the balloons will cause the balloons to swing in to the hand because it has an opposite charge. Removing the hand will force the balloons apart once again. Have the students add this demonstration as another labeled technical drawing in their science journals. Once again, a teacher example would be helpful to students.

The same charge on the balloons causes them to repel.
Like charges repel.

Have small groups of students brainstorm examples of static electricity in everyday life. Share examples with the rest of the class.
Some examples:

laundry sticking together after coming out of the dryer
hair sticking up after jumping on a trampoline
combing or brushing clean, dry hair
getting "shocked " by someone
shuffling across carpet and touching a T.V. that is turned on
lightning (see background explanation and help students make the connection between static electricity and lightning.)

Students will experiment with static electricity by doing the following activity:

Pass out Kit #1 to students in pairs or small groups. Students will need the balloon, tissue paper, and wool at this time.
Students inflate their balloons, then charge them by rubbing them against the wool.
Make a small tissue paper pile.

Lower the charged balloon toward the tissue paper pile.
Observe and record what happens to the paper.

Pairs of students will recreate the teacher demonstration of the two balloons on a stick by charging their balloons with the same source and then setting them near each other on a flat surface such as a desk. This will show that like charges repel.

Students can answer questions on the data sheet, either as a whole class, in groups or individually.

Students will store their inflated balloons separately for use in the coming lessons. If desired, they may write their names on the balloons in permanent marker.

Extensions

Soda Can Race: Each team has an empty soda can and a balloon. Prepare a four to six foot course. Each team can choose the type of material they would like to use to charge their balloon. Most students will try to “push ” their can with the charged balloon. (The surprise is that pulling the empty can works much better.) Racing on a tile floor rather than a carpeted one yields more satisfying results.

Write a story about the balloon and the tissue paper from the perspective of the tissue paper. How does it feel? What does it think about its experience? What is its name? How does it get off the balloon? Where does it go and why?

Describe an experience you've had with static electricity through your senses (how did it look, feel sounded.). What evidence did you have that it was static?

Have students notice and record evidence of static electricity in their homes. Have them share experiences in class.

Assessment Plan

Make a technical drawing of statically charged hair reacting to a balloon or comb. Write three or four sentences about what happened and why. Make a list on the board of important vocabulary words students should include in their explanations.

Draw a picture of the balloon and tissue papers. Label the charges. Write the reasons for the initial attraction of the papers to the balloon. Draw two balloons that have the same charge. Label the charges and write the reaction of the two when they are put close together.

Bibliography

This lesson is part of the Fifth Grade Science Teacher Resource Book (TRB3). The TRB3 is designed to be your textbook in teaching science curriculum to your students. This book covers all the objectives of each standard and benchmark. If taught efficiently, a student should do well on the End-of-Level (CRT) tests. The TRB3 is designed for teachers who know very little about science, as well as for teachers who have a broad understanding of science.

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