Investigation Two – Will it Hold a Charge?

Standard IV
Students will understand features of static and current electricity.

Objective 1
Describe the behavior of static electricity as observed in nature and everyday occurrences.

Intended Learning Outcomes
1. Use science process and thinking skills
4. Communicate effectively using science language and reasoning

Standard IV

Objective 1

Background Information

Kit #1 refers to the kit used in the previous lesson. Small groups of three or four may share kits. Not all things will accept or hold a static charge in the same way. The activities in this section will demonstrate how to create a greater charge and why some items are better able to hold a charge. Materials such as wool, silk, flannel, and fur or hair will hold a charge well, as will items made of rubber, glass, and plastic. Conductors of electricity (such as metal) do not hold a charge well.

Pre-Assessment/Invitation to Learn

Ask the students to make predictions about the answers to questions like the following: Will all materials hold equal static charges? What types of items will hold the greatest charges? Does the type of material used have an effect on the production of a static charge?

Review the previous lesson and activities with the students. Emphasize that like charges repel and opposite charges attract. Recall examples of real life occurrences of static electricity including lightning.

Instructional Procedure

1. Explain to the students that they will be:
   - Conducting experiments to further investigate what types of objects can be statically charged.
   - Using wool and fur or their hair to create charges
   - Comparing charges and recording their findings.
2. Pass out Kit #1 to each group.
3. Give each student a "Static Charges" data sheet on which to record their findings. Students may work together and share findings. The top half of the worksheet is for students to compare and record the amount of static charge produced by rubbing the items in the kit with the wool, animal fur or their hair. They will record their discoveries on the sheet by counting how many tissue paper pieces were attracted to each item.

Materials

- "Static Charges" worksheet
- Kit #1
  Kit #2
- Tissue paper
- Pieces of eraser crumbs
- Yarn pieces
- Sawdust
- Paper dots
- Puffed rice (housed in individual snack-sized plastic locking bags)

4. After allowing students enough time to complete their tasks, have them put away their kits. Discuss their findings as a class. Discussion may include which items were able to hold the greatest and weakest charges; which materials created the greatest and weakest charges; and possible reasons. See background for reasons for reactions.
5. After the discussion, you may wish to end the lesson for the day and begin again during the next science session.

Next Lesson:

1. Pass out Kits #1 and #2. During this lesson students will use the friction rod and wool cloth to test the effect of a charge on the items in Kit #2.
2. Pour about an inch into each plastic cup.
3. Students will record their findings on the data sheet in the appropriate boxes by counting how many items were attracted to the charged rod. Some are hard to count (eraser crumbs, saw dust), so students should indicate whether many or few pieces of eraser and saw dust were attracted to each charged item.
4. Discuss the findings with the class. Include which items were attracted to the charged items and which items were easiest to charge. Draw conclusions from the results.
5. Assign homework. Using their balloons from the introductory lesson on static electricity, students will discover what can be attracted to a static charge in their homes. The next day they will report their findings to their groups and then a group spokesperson will report two or three of the most unusual items to the class. Reiterate which types of materials and items best hold a charge and why.

Curriculum Extensions

Science –

- Students could try using other materials to test their reactions to static electricity such as laminating film scarps, plastic shavings from PVC pipe, and different weights and types of paper. (ILO 1)
- How do you know that your hair or your clothes are statically charged? Share at least two ways. (ILOs 2, 3)
- Graph the data about how many tissue paper squares are picked up. (ILO 4)

Assessment Suggestions

- Prepare a list of what will and won't hold a charge or list items previously tested and other similar items in your journal. Students will identify which items will and won't hold a charge.

Reference to Assessment Section:

	Multiple Choice	Constructive Response	Performance Test
Unit Test	1, 2 , 3, 4, 5, 6	1, 2, 3	Changing Cheerios

Resources

Books –

- Hixson, B.K. Edison Etc.
- Parsons, Aexandra. Make it Work! Electricity. ISBN 0-590-54461-6
- Simon, Seymour. Lightning. ISBN: 0-590-12122-7
- Graf, Mike. Lightning! And Thunderstorms. ISBN: 0-6889-82018-6
- Farndon, John. Electricity (Science Experiment Series). New York: Benchmark Books. ISBN 0-7614-1086-4

Magazine –

- THE MAILBOX – *Intermediate* – Feb./Mar. 1998

Web sites –

- www.askjeevesforkids.com search static electricity and lightning
- www.sciencemadesimple.com/static
- www.miamisci.org/af/sln/frankenstein/static
- www.usoe.k12.ut.us/curr/Science/core/5th/sciber/

Videos –

See Investigation One Resources

Name _____

Static Charges

1. Use the wool to charge the items in Kit #1.
2. Use tissue paper pieces to determine the charges.
3. Count the number of tissue paper pieces attracted to each item and record your findings in the appropriate blanks.
4. Wipe the charge from the rod with your hand and recharge the rod with your hair or animal fur.
5. Repeat steps 2 & 3
6. Repeat all steps using your own hair or the animal fur.

Items	Wool	Hair or fur
Friction rod		
Metal rod		
Balloon		
Comb		
Iron nail		
Wooden pencil		
Pen		
Plastic bag		
Penny		
Plastic spoon		
Key		

1. Which items were best able to hold the static charge?

2. What did they have in common?

3. What did the items that wouldn't hold a charge have in common?

4. What conclusions about static electricity can you draw from your findings?

Next Lesson

1. Charge the friction rod and investigate how the materials in Kit #2 react to it.
2. Record your findings in the appropriate boxes by counting the number of each identified item that was attracted to the charged rod. Since eraser crumbs and sawdust are difficult to count, note if there was a strong or weak attraction by writing "S" for strong or "W" for weak.
3. Repeat for each item until all have been tested.

	Tissue Paper	Eraser Crumbs	Yarn	Sawdust	Paper Dots	Puffed Rice
Friction rod						