SCIENCE NORTH SCIENCE NORD
SUDBURY, ONTARIO, CANADA

Static Electricity: Charging by Induction and Contact

Grade 9 Academic - Physics

Lesson Plan

Cross Curricular	
Safety Notes	Be careful not to cut yourself on the pop can tab.

Big Ideas

- Static and current electricity have distinct properties that determine how they are used.

Learning Goals

- Learn the law of electric charges
- Learn the transfer of static electric charges by induction
- Learn the transfer of static electric charges by contact

Materials

For each group of students:

- 1 Balloon
- 1 empty 355ml pop can
- Foil
- Styrofoam cup
- Fur cloth
- Tape
- Lesson Overview handout
- Homemade Electroscope Activity handout

Specific Expectations

A1.10 draw conclusions based on inquiry results and research findings, and justify their conclusions

A1.11 communicate ideas, plans, procedures, results, and conclusions orally, in writing, and/or in electronic presentations, using appropriate language and a variety of formats (e.g., data tables, laboratory reports, presentations, debates, simulations, models)

A1.12 use appropriate numeric, symbolic, and graphic modes of representation, and appropriate units of measurement (e.g., SI and imperial units)

E2.1 use appropriate terminology related to static and current electricity

E2.2 conduct investigations into the transfer of static electric charges by friction, contact, and induction, and produce labelled diagrams to explain the results

Description

Students will learn about static electricity and charging by induction and contact by building an electroscope, a device that can be used to detect the presence of an electric charge.

Accommodations/Modifications

Students have the opportunity to type, verbally record with speech-to-text programs, and draw their answers.

Introduction

- The educator will have a balloon blown up at the beginning of class and tie a knot to close the balloon.
- The educator will ask the class a question "have you been able to stick a balloon onto a wall after rubbing it on your sweater?"
    - The educator could then rub the balloon on their sweater or ask for a volunteer to do so, and then hold the balloon very close to, but not touching, the wall in the classroom for 3 seconds. Then stick the balloon against the wall.
- The educator can then ask students to collaborate with others in answering "How is this possible when the wall is neutral?"
    - The educator will conduct a classroom discussion on the topic, possibly writing student ideas and responses into a concept or mind-map on the board.
- The educator will divide students into groups of 3 or 4.
- The educator will then distribute the *Lesson Overview* handout, the *Homemade Electroscope Activity* handout, and the required materials to each group.

Action

- In their groups, students will work together to follow the instructions and build the Homemade Electroscope out of the provided materials.
- Students will complete the Charging by Contact activity and complete Questions #1-3 on the *Homemade Electroscope Activity* handout.
- Students will complete the Charging by Induction activity and complete Questions #4-8 on the *Homemade Electroscope Activity* handout.

Consolidation/Extension

- The educator will conduct a carousel activity for students to discuss their findings with other groups.
    - The educator will randomly provide half the groups with numbers (Ex. Group 1, Group 2, and Group 3) and the other half of the groups with letters (Ex. Group A, Group B, and Group C).
    - The groups with numbers will be stationary and the groups with letters will be mobile.
    - To discuss the findings of the Charging by Contact activity, Group A will visit Group 1, Group B will visit Group 2, and Group C will visit Group 3. After each carousel discussion, the educator will conduct a class discussion, so ideas and points can be shared with everyone.
    - The educator will then ask the groups with letters to move and meet with the next group with a number to discuss Charging by Induction Part 1. Group A will visit Group 2, Group B will visit Group 3, and Group C will visit Group 1. The educator will then the educator will conduct a class discussion, so ideas and points can be shared with everyone.
- The carousel activity will continue until all of the questions in the *Homemade Electroscope Activity* handout have been reviewed and discussed.