Static Electricity: Charging by Friction | Grade 9 Academic - Physics

Lesson Plan

Cross Curricular	N/A
Safety Notes	Be careful not to pop the balloons.

Big Ideas

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

Learning Goals

- Learn how to formulate hypotheses and conduct a scientific experiment
- Understand how to analyse and interpret qualitative and/or quantitative data
- Learn the law of electric charges
- Learn the transfer of static electric charges by friction

Materials

For each group of students:

- 1 Balloon
- 1 empty 355ml pop can
- Fur cloth
- Timer
- Tape
- Meter stick
- Calculator
- Lesson Introduction handout
- Pre-Lab Questions and Lab handout
- Post-Lab Questions handout

Specific Expectations

A1.1 formulate scientific questions about observed relationships, ideas, problems, and/or issues, make predictions, and/or formulate hypotheses to focus inquiries or research
A1.5 conduct inquiries, controlling some variables, adapting or extending procedures as required, and using standard equipment and materials safely, accurately, and effectively, to collect observations and data
A1.6 gather data from laboratory and other sources, and organize and record the data using appropriate formats, including tables, flow charts, graphs, and/or diagrams
A1.8 analyse and interpret qualitative and/or quantitative data to determine whether the evidence supports or refutes the initial prediction or hypothesis, identifying possible sources of error, bias, or uncertainty
A1.10 draw conclusions based on inquiry results and research findings, and justify their conclusions
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
E2.3 predict the ability of different materials to hold or transfer electric charges (i.e., to act as insulators or conductors), and test their predictions through inquiry

Description

Students will learn about static electricity and charging by friction by formulating hypotheses and conducting a scientific experiment on whether an empty pop can is repelled or attracted to a charged balloon. Students will study the relationship between the time spent charging by friction and the electric force between two objects.

Accommodations/Modifications

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

Introduction

- This lesson begins with an educator reviewing the term **static electricity** and providing everyday examples by reading the *Lesson Introduction*.
    - Students should follow along, highlighting words they do not fully understand, so they can look up the definition, examples, or videos on the concept.
- The educator will read the problem from the *Lesson Introduction Handout*, that students will try to solve.
    - Students will take 5 minutes to create a mind-map with word and pictures
    - A class discussion will then take place around what students wrote down or drew in their mind map
- The educator will ask students to volunteer to read each step of the procedure from the *Lesson Introduction Handout*, or the educator will read the procedure themselves, pausing after each step to check for student understanding.
- The educator will then divide students into groups of 3 or 4 and provide each group with the required materials.

Action

- Students will work together in their groups to complete Questions #1-7 on the *Pre-Lab Questions and Lab* handout.
- Students will check their hypotheses and answers with the educator before beginning the scientific procedure.
- In their group, students will follow the steps to complete the procedure, recording their observations, data, and calculations in Table 1 on the *Pre-Lab Questions and Lab* handout.
- In groups or individually, students will complete the *Post-Lab Questions* #1-6.

Consolidation/Extension

- Discuss, as a class, each group's results and their responses to the *Post-Lab Questions.*
- Students will complete *Post-Lab Questions* #7 to visually represent their findings from the lab.