

## Static Electricity

Mod.3.1

### TIME

150 minutes

### OVERVIEW

Students investigate static electricity in common objects. They construct an electroscope to test a variety of objects for static electricity. They write a definition of static electricity using the appropriate vocabulary they learn throughout this learning experience.

### LEARNING OUTCOMES

Through this learning experience (LE), students will achieve specific learning outcomes (SLOs) in various subject areas. Consider the intent of this LE and your choice of instructional and assessment strategies to determine which SLOs students may achieve, in addition to those identified.

#### English Language Arts

Consider the intent of this LE and your choice of instructional and assessment strategies to determine which SLOs students may achieve, in addition to those identified below:

- 1.1.1 *Express Ideas* — Engage in exploratory communication to share personal responses, make predictions, and discover own interpretations.
- 1.2.1 *Develop Understanding* — Reflect on prior knowledge and experiences to arrive at new understanding.
- 1.2.2 *Explain Opinions* — Explain personal viewpoints in clear and meaningful ways and revise previous understanding.
- 1.2.4 *Extend Understanding* — Appraise ideas for clarity and ask extending questions; select from others' experiences and ideas to extend ways of knowing the world.
- 2.3.3 *Vocabulary* — Experiment with ambiguity in language [such as puns, jokes based on multiple meanings, poetry...] in a variety of contexts.
- 5.2.1 *Cooperate with Others* — Assist group members to maintain focus and complete tasks; identify and solve group process issues.

#### Science

Consider the intent of this LE and your choice of instructional and assessment strategies to determine which SLOs students may achieve, in addition to those identified below:

- SLOs related to Scientific Inquiry or the Design Process in Cluster 0: Overall Skills and Attitudes.
- 6-3-01 Use appropriate vocabulary related to their investigations of electricity.  
*Include: positive charge, negative charge, current electricity, static electricity, electrical circuit, insulator, conductor, switch, series circuit, parallel circuit, electromagnet, magnetic field, motor, generator, transformation, electrical energy, renewable, non-renewable, energy consumption.*
- 6-3-02 Explain the attraction and repulsion of electrostatically charged materials.  
*Include: negatively and positively charged materials attract one another; materials of like charge repel one another.*
- 6-3-07 Experiment to classify a variety of materials as insulators or conductors.

**ICT LITERACY SKILLS AND COMPETENCIES**

Consider the intent of this LE and your choice of instructional and assessment strategies to determine which skills and competencies students may achieve, in addition to those identified below:

- basic operating skills
- inquiry using electronic sources
- spreadsheet analysis

**SUGGESTED LEARNING RESOURCES****Software**

- spreadsheet

**Internet**

- IMYM Links Database: <<http://www.edu.gov.mb.ca/ks4/tech/imym/resources/links.html>>

**Video**

- Manitoba Hydro. *A Spark in the Dark: Static Electricity*. Videocassette. Winnipeg, MB: Manitoba Hydro, 1991. (VHS, 12 min.)

**Print**

- Appendix C: Index of Teaching and Learning Strategies and Tools
- Manitoba Education and Training. *Grades 5 to 8 Science: A Foundation for Implementation*. Winnipeg, MB: Manitoba Education and Training, 2000.
- Manitoba Hydro. *Electrical Terminology*. Winnipeg, MB: Manitoba Hydro, n.d.

**BLM**

- BLM Mod.3.1#1: Electrostatics Test

**TBLM**

- TBLM Mod.3.1#1: Conducting a Fair Test: Observation Checklist

**Materials**

- balloons
- plastic rulers
- cloth (wool, silk, cotton)
- pieces of paper
- comb
- puffed rice
- plastic bags

**SUGGESTIONS FOR INSTRUCTION****Preparation and Set-up**

- Assemble all materials listed in the Suggested Learning Resources.
- Access appropriate websites listed in the IMYM Links Database for this LE. Bookmark the websites on the class computers or ask students to do so before beginning this LE.
- Contact another Grade 6 teacher to plan an email exchange of students' experiments and observations during the LEs in Module 3: Explore Electricity: The Backbone of Modern Inventions (see ICT.3: Riddle This).

### Activating Strategies

- **Note:** Explain and demonstrate proper handling techniques and safety procedures for equipment throughout this LE.
- Make and post a class Word Splash of appropriate vocabulary. Start with about six words related to electricity (e.g., repel, attract, charged, static). Students write a definition for the words in their notebooks, based on their prior knowledge. In collaborative groups, they discuss their definitions. Later, all groups share their definitions with the class, to refine their understanding. As they work through the LEs in this interdisciplinary unit, students add more electricity-related words to the class Word Splash.
- Demonstrate an example of static electricity (e.g., quickly removing a wool hat so that hair “stands on end”). Students hypothesize what is happening and try to explain it. Record all their hypotheses on a class Hypothesis Chart.
- Demonstrate the following:
  - Inflate a balloon and hold it up to a wall. (It falls.)
  - Rub the balloon on someone’s hair and hold it up to the wall. (It sticks.)Students hypothesize what happened and record their findings on the class Hypothesis Chart. Use correct terms (e.g., positively charged, negatively charged, attracts) when describing what is happening.
- Students brainstorm for times when they have encountered static electricity (e.g., shuffling feet on a carpet and touching someone, waving a hand near a TV, brushing hair, removing coat and finding clothes stuck to body). Students should use applicable terms (e.g., repel, attract, positively charged, negatively charged, static).

### Acquiring Strategies

- Students investigate more static electricity using materials assembled for this LE. They note their observations.
- Students watch the video *A Spark in the Dark: Static Electricity* (Manitoba Hydro). They review their electricity-related terms and definitions.
- Students share their observations related to experimenting with static electricity and explain what is happening using appropriate vocabulary.
- Students review each hypothesis about objects and static electricity on the class Hypothesis Chart. Based on what they have learned so far, they discuss which hypotheses are valid, which are not valid, and why.

### Applying Strategies

- Students go on the Internet to find directions for constructing an electroscope. Following directions found at a selected website, students construct an electroscope in their collaborative groups. They test a variety of objects found in the classroom and record what happens during each test.
- In collaborative groups, students re-test the objects previously tested, as well as any others they think might be suitable. Using appropriate vocabulary, students complete BLM Mod.3.1#1: Electrostatics Test. They record on a chart or on a spreadsheet which objects share a positive attraction and which ones share a negative attraction. Students post the charts or spreadsheets in the classroom.
- Students do a Gallery Walk, reading the various charts or spreadsheets for findings. Any findings that are different from their own should be noted, investigated, and discussed further.
- Students write a definition of “static electricity” in their science notebook, on an Exit Slip, or in an email to their teacher, using appropriate vocabulary correctly.

### **Variations/Extensions**

- Add the vocabulary on electricity to the class Vocabulary Database (see OLE.2: Daily Edit and ICT.12: Chart This).
- Use students' definitions of "static electricity" or other student-composed text in OLE.2: Daily Edit.

### **SUGGESTIONS FOR ASSESSMENT**

- Read the Hypothesis Chart generated and reviewed by the class. Note gaps in students' understanding and address any issues that are not clear.
- Review BLM Mod.3.1#1: Electrostatics Test to determine students' understanding of the concepts.
- Use the vocabulary on electricity for spelling practice.
- Observe students' work habits and proper handling of equipment using TBLM Mod.3.1#1: Conducting a Fair Test: Observation Checklist.
- Check group charts or spreadsheets for correct use of appropriate vocabulary.
- Check whether students use appropriate vocabulary in their class and group discussions.

### **CONNECTION TO INVENTION CONVENTION**

- Students' experimentation with electricity helps them understand electricity as an important force behind major inventions and helps them think about how they can use electricity in developing their own invention.

### **BLM Mod.3.1#1: Electrostatics Test**

Name \_\_\_\_\_ Date \_\_\_\_\_

Use words and diagrams to answer the following questions.

1. What happens when uncharged materials are placed together?
  
  
  
  
  
  
  
  
  
  
2. What happens when uncharged materials come in contact with a statically charged material?
  
  
  
  
  
  
  
  
  
  
3. What happens when two statically charged materials come together?

\_\_\_\_\_ **Electrostatics Test:** Reproduced from *Grades 5 to 8 Science: A Foundation for Implementation* (Manitoba Education and Training 6.75).

### TBLM Mod.3.1#1: Conducting a Fair Test: Observation Checklist

Experiment \_\_\_\_\_ Date \_\_\_\_\_

A group of students can be selected as a focus for observation on a given day, and/or one or more of the observational areas can be selected as a focus. The emphasis should be on gathering cumulative information over a period of time.

Student Names	Has Safe Work Habits (workspace, handling equipment)	Ensures Accuracy/ Reliability (e.g., repeats measurements)	Works with Group Members to Carry out Plan	Shows Evidence of Perseverance and/or Confidence	Comments
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					

**Conducting a Fair Test: Observation Checklist:** Reproduced from *Grades 5 to 8 Science: A Foundation for Implementation* (Manitoba Education and Training BLM 6-G).