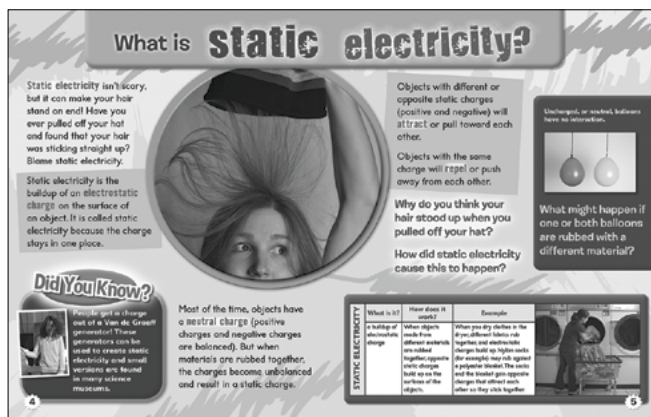


# Creating Static Electricity



**Focus:** Students explore the force of static electricity and identify static electricity and its effects in their everyday lives.

## Specific Curriculum Outcomes

**Students will be expected to:**

- 34.0 pose new questions that arise from what was learned [GCO 2]
- 37.0 describe and demonstrate ways to use everyday materials to produce static electric charges, and describe how charged materials interact [GCO 1/3]
- 38.0 describe examples of the effects of static electricity in their daily lives and identify ways in which static electricity can be used safely or avoided [GCO 1/3]

## Performance Indicators

**Students who achieve these outcomes will be able to:**

- use different materials to statically charge various objects, and describe their interactions with other charged and uncharged materials
- identify ways to stay safe during a thunderstorm

## NOTES:

## Attitude Outcome Statements

### Encourage students to:

- work with others in exploring and investigating [GCO 4]

## Cross-Curricular Connections

### Math

#### It is expected that students will:

- collect first-hand data and organize it using charts to answer questions [3SP1]

### English Language Arts

#### Students will be expected to:

- communicate information and ideas effectively and clearly, and to respond personally and critically [GCO 2]

## Getting Organized

| Components                                                                                                                                                                                                                                                                                                                                                                                                        | Materials                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Before You Begin                                                                                           | Vocabulary                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>• Student Magazine, pages 4–7</li><li>• IWB Activity 2</li><li>• BLM <i>How Long Did It Stick?</i></li><li>• IWB Activity 3</li><li>• IWB Activity 4</li></ul> <b>Literacy Place:</b> <ul style="list-style-type: none"><li>• <i>Felicity Discovers Electricity</i> (Guided Reading, Level M)</li><li>• <i>Make Electrostatic Slime</i> (Guided Reading, Level L)</li></ul> | <ul style="list-style-type: none"><li>• inflated balloons</li><li>• fur or wool</li><li>• polyester or plastic wrap</li><li>• paper plates, salt, pepper</li><li>• students' Science Journals</li><li>• plastic comb and materials such as tissue paper, aluminum foil, paper</li><li>• variety of objects such as inflated balloons, plastic combs, Ping-Pong balls, plastic rulers, foam plates, paper, string, fabric such as felt, cotton, polar fleece, silk, wool, and fur</li><li>• students' Science Folders</li></ul> | <ul style="list-style-type: none"><li>• Inflate and tie off balloons (one per pair of students).</li></ul> | <ul style="list-style-type: none"><li>• static electricity</li><li>• electrostatic charge</li><li>• positive charge</li><li>• negative charge</li><li>• neutral charge</li><li>• attract</li><li>• repel</li></ul> |

## Safety

- If any students have a latex allergy, modify the materials or the activities accordingly to avoid the use of latex balloons.

## Science Background

- Without touching them, an object that has been electrically charged pulls on other uncharged objects and may either push or pull other charged objects.
- Static electricity does not need contact to apply a force. It can make lightweight objects such as tissue paper or pieces of paper “jump” or “stick.”

- When two materials are rubbed together, electrons (i.e., negatively charged particles in atoms) move from one material to the other. The materials will gain opposite charges due to an excess of electrons in one material (negative charge) and a reduction of electrons in the other (positive charge). If two similar objects are rubbed with the same material, they will both gain the same charge and will repel each other.

**Note:** Teachers should avoid using the term “electron” with students.

Students are not expected to be able to explain the buildup of static charges as the transfer of negative particles/charges or electrons.

- Electrostatic Series (when any two of the following materials are rubbed together, the one higher in the list becomes positively charged and the one lower becomes negatively charged):
  - dry human skin
  - glass
  - human hair
  - nylon
  - wool
  - fur
  - silk
  - paper
  - cotton
  - hard rubber
  - polyester
  - styrene (Styrofoam)
  - plastic
- Lightning is caused by static electricity. Sparks jump between two areas of opposite and built-up electrical charges. Some charges jump from one part of a cloud to another. Others jump from a cloud to the ground and then return back to the cloud. These two strokes appear as one lightning bolt and take place in less than a second.

## ACTIVATE



### Introducing Static Electricity

Introduce pages 4–5 of the Student Magazine to the class. Provide time for students to examine this spread and read the question: *What is static electricity?* Read the text with the students then invite them to share any experiences they have had with static electricity in their daily lives. For each situation mentioned, briefly explain how the static electricity may have caused the situation to happen. Add the term “static electricity” to the Word Wall.

### Demonstrating With Statically Charged Objects

Demonstrate for students how statically charged balloons and uncharged balloons interact when they are brought near to each other. Tell the students that you are going to bring close two uncharged or neutral balloons. Bring the balloons together and ask:

- **What did you observe?**
- **What happens when uncharged materials are placed together?** (Nothing.)

Now rub one of the balloons with a piece of fur or wool and explain to students that this balloon has been statically charged. Bring the charged balloon close to the uncharged balloon and ask:

- **What did you observe this time?**
- **What happens to an uncharged material when a statically charged material is placed near it?** (It is attracted to the charged material.)

Rub one balloon with the fur or wool and rub the second balloon with a different material such as polyester or a piece of plastic wrap. Explain that these balloons are both charged. Bring the balloons close together and ask:

- **What happens when two statically charged materials are placed near to each other?** (They attract one another if they have different charges and repel if they have the same charge.)



Define the terms “electrostatic charge,” “attract,” and “repel” and add these terms to the Word Wall.

## CONNECT

### Salty Pepper



Students can work in pairs or small groups to investigate using a charged balloon to try to attract salt and pepper. Thoroughly mix a teaspoon of both salt and pepper on a plate for each group. Have students predict which materials will be picked up by the charged balloon. Students can record their predictions in their Science Journals.

Students can charge a balloon by rubbing it on their hair and then bring it slowly closer to the materials on the plate. Students should record their observations in their Science Journals. Discuss the results as a whole group. Ask:

- **Were your predictions supported?** (Pepper will be picked up first because it is lightest, and salt will be picked up if the balloon is brought very close to the plate.)



Explain that by rubbing the balloon on their hair, the balloon was given a negative electrical charge. The salt and pepper both have a neutral charge, and because charged objects attract neutral objects, the pepper and then the salt rose from the plate and stuck to the balloon. This is static electricity! Invite students to add new questions based on their observations to the I Wonder Wall.

### Charge It!

Provide each student with an inflated balloon or a plastic comb. Invite them to explore rubbing different materials on the object to charge it and see what it will attract (e.g., tissue paper, aluminum foil, paper, etc.), or how long it will cling to something.

## Producing Static Electricity

Students can work with a partner or in a small group to explore using a variety of materials (balloons, plastic comb, Ping-Pong balls, plastic rulers, foam plates, paper, string, fabric such as felt, cotton, polar fleece, silk, wool, and fur) to produce static electricity.

- **How can you produce static electricity?**
- **What materials are most effective for producing static electricity?**
- **How might we safely discharge or get rid of the static electricity?**

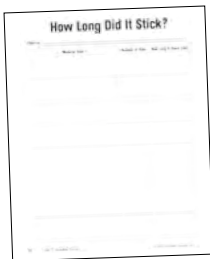


Ask students if they have new questions. Any new questions should be recorded on the I Wonder Wall.

- **IWB Activity:**
- Challenge students to
- use Activity 2: *Is it static electricity?* (see the
- Teacher's Website) to
- sort the effects shown as
- those caused by static
- electricity and those
- not caused by static
- electricity.



## CONSOLIDATE



### Sticking Time

Students can work in pairs to select the three materials they predict will work best to create electrostatic charges. Have them investigate to see if increasing the number of times a balloon is rubbed will increase how long it will stick to the wall. Students can use BLM *How Long Did It Stick?* to record their observations.

- **Did certain materials make the balloon stick to the wall for a longer time?**
- **Did increasing the number of rubs make the balloon stick longer?**



Invite the pairs of students to share the procedure they followed and their results with the class. Have students store their completed BLMs in their Science Folders.



### Class Competition

Have a class competition to see which group can move an object the farthest using only the force of static electricity. Have students record in their Science Journals how to produce a static charge.

### Scavenger Hunt

Challenge students to go on a scavenger hunt to find helpful uses of electrostatic forces in the school environment, e.g., cleaning products (Swiffer dusters, dust mitts) and plastic wrap. Challenge students to add examples from home to the list.

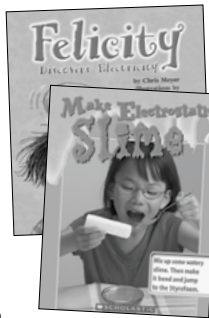


### Lightning Safety

Share pages 6–7 of the Student Magazine with the class. Read the title question aloud: *How can you stay safe in a thunderstorm?* Give students time to examine this spread by reading the text and looking at the images. Have students participate in a Think-Pair-Share strategy by deciding which actions they should and should not do during a thunderstorm. Students can then share their reasoning with a partner before sharing their ideas with the whole class.

#### IWB Activity:

- Students can identify safe locations using Activity 3: *Which places are safe in a lightning storm?* (see the Teacher's Website).



### Literacy Place Connection:

Read or revisit *Felicity Discovers Electricity* (Guided Reading, Level M) and *Make Electrostatic Slime* (Guided Reading, Level L) with students. Read each investigation aloud, pausing before the explanation is given. Invite students to explain the results and then confirm or revise their ideas by reading the explanations in the text. Invite students to try any of the investigations that interest them.

## EXPLORE MORE

### Static Around Us

Invite students to research the uses of static electricity in the world around us (e.g., ink-jet printers, air purifiers, photo copiers, car painting, and some screen protectors for mobile devices). Ask:

- How do static forces affect your life?

### Lightning Count

Share with students, or have them research, the method for estimating the distance of lightning from the viewer by counting the number of seconds between the lightning flash and the sound of the thunder. The longer the time between, the further away the lightning. Encourage students to use the method during a thunderstorm.

#### IWB Activity:

- Challenge students to identify true facts about lightning using Activity 4: *Lightning true or false* (see the Teacher's Website).



# How Long Did It Stick?

Name: \_\_\_\_\_

| Material Used | Number of Rubs | How Long It Stuck (min) |
|---------------|----------------|-------------------------|
|               |                |                         |
|               |                |                         |
|               |                |                         |
|               |                |                         |
|               |                |                         |
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