



## Classroom Teacher Preparation

### Physics 7: Electrostatics

Please use the following to prepare for the next SfS lesson.

#### Description:

There are two types of electricity: current and static. This lesson focuses on static electricity, which is a charge separation (buildup of an electric charge) on the surface of an object. This is different from current electricity, which is the flow of electrons. During the activity, students will assemble an electroscope, an instrument used to detect the presence and magnitude of an electric charge on an object, and then test different materials to determine which build up more or less electrostatic charge.

#### Lesson Objectives – SWBAT (“Students Will Be Able To...”):

3<sup>rd</sup>-8<sup>th</sup>

- Recognize that atoms contain charged particles (protons and electrons) and uncharged particles (neutrons)
- Understand that static electricity is the buildup of an electric charge on the surface of an object, and that it is different from current electricity, which is the flow of electrons
- Understand that rubbing some materials together results in charge being moved from one surface to another, and that this can cause objects to be attracted to or repelled by each other

#### Disciplinary Core Idea (DCI)

PS3 Energy – PS3.A Definitions of Energy

- (3<sup>rd</sup>-5<sup>th</sup>) Moving objects contain energy. The faster the object moves, the more energy it has. *Energy can be moved from place to place by moving objects, or through sound, light, or electrical currents.* Energy can be converted from one form to another form.
- (6<sup>th</sup>-8<sup>th</sup>) Kinetic energy can be distinguished from the various forms of potential energy. *Energy changes to and from each type can be tracked through physical or chemical interactions.* The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter.

#### Science & Engineering Practice (SEP)

Asking Questions and Defining Problems

#### Preparation:

This lesson is an introduction to the topic. It would be ideal to teach it after *P02: Electricity* or *P08: Circuits*.

#### Room Set Up for Activities:

Students will be working in small groups (3-5) at their desks.

Important note: This activity should be taught on a dry day/in a dry environment (e.g., a classroom with air conditioning). Beyond 80% humidity, it will not work so well.

#### Safety:

There are no safety precautions for this lesson. However, students will be rubbing materials on their hair, so **please** tell us if there have been any recent lice outbreaks.



## Related Modules:

This lesson may be taught as part of a sequence or group of related modules on **Electromagnetism**. Other modules in this sequence include:

*Physics 2: Electrical Conductivity* – In this introduction to electrical conductors and insulators, students are challenged to build a simple circuit, test and classify various materials as conductors or insulators, and add a switch to the circuit.

*Physics 8: Circuits* – Students will experiment by creating three circuits with light bulbs: a simple circuit, a series circuit, & a parallel circuit.

*Physics 9: Electromagnetism* – Students build and test their own electromagnets, gaining an experiential understanding of how electromagnets work and how to modify the magnetic fields they produce.

For other module sequences and groups, look here: [www.sciencefromscientists.org/sequences](http://www.sciencefromscientists.org/sequences)

## Standards Covered:

Please click the following link to our website to review the standards covered by this lesson, listed by state: <http://www.sciencefromscientists.org/standards/>

Lessons are matched to both national NGSS and local state standards.

## After Our Visit:

*Extend this lesson by experimenting with bubbles and static electricity.*

Access this Extension activity by visiting the Classroom Post found on our website at [sciencefromscientists.org/cohorts](http://sciencefromscientists.org/cohorts). Use the name of your school/cohort and password to log in.

To help Evaluate, check out our Open Response questions online at [sciencefromscientists.org/open-response-questions](http://sciencefromscientists.org/open-response-questions). They are freely available for all of our lessons for current teachers. Use the password supplied by your instructor to log in.

## Additional Resources:

- Testing for Static Electricity (4:19): <http://mass.pbslearningmedia.org/resource/phy03.sci.phys.mfe.zele/testing-for-static-electricity/>
- Our own Dr. Erika explains static electricity (12:02): <https://www.youtube.com/watch?v=6l0-Z7yqnf4>
- SciShow Kids – “What causes thunder and lightning?” (3:37): [https://www.youtube.com/watch?v=fEiVi9TB\\_RQ](https://www.youtube.com/watch?v=fEiVi9TB_RQ)
- The Dangers of Electrostatic Electricity – An informative video (4:30): <https://www.youtube.com/watch?v=XKAhx4NdJTs>