Charge It!

Companion Mini-Units on

Static and Current Electricity

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Major Concept: Electricity

Content	Skills
current	collecting data
static	using graphs
circuit	recognizing patterns
switch	inferring
electrons	using tools and models
positive/negative	communicating results
friction	
conductor/insulator	

Core Content:

SC-E-1.3.3 Electricity in circuits can produce light, heat, sound, and magnetic effects. Electrical circuits require a complete conducting path through which an electrical current can pass.

SC-M-1.3.5 Electrical circuits provide a means of transferring electrical energy when heat, light, sound, and chemical changes are produced.

Challenge:

Electricity is found in two forms: static and current. To see static, take a sweater out of your dryer and put it on---watch your hair go! Why does this happen? Take a look at friction and the movement of electrons.

Current electricity travels along a path from an energy source. The path must be a conductor---electricity must be able to easily flow through the material. The path must be a closed circuit for the current to flow through.

Pre-Assessment

Have each student do a KWL chart about static/current electricity. Instruction can be differentiated based on the information given in the "Know" column as well as a class discussion.

Differentiated Products

Lower readiness students may just define and describe the effects of static/current electricity in writing or chart form. Drawings may be appropriate for some. Open response question may be simplified. *

Higher readiness students may create experiments to prove or disprove their own hypothesis about the effect of static in a certain situation. They may also extend any of the tasks by changing a key or critical element in the task and telling how this would effect the outcome, making sure that they go for something useful, insightful, and intellectually or scientifically meaningful as their choice.

Multiple intelligences may be addressed by creating a product that uses the concepts through music, by acting out kinesthetically the motion of electrons along the path, by verbalizing the concepts to a partner, writing conclusions to the tasks, and flexible grouping.

* electrical safety website:
www.miamisci.org/af/sln/frankenstein/safety.html

Static

Proposed Tasks:

Task 1: "Hairdo Gremlins," a Wild Goose activity. The student will explore static electricity.

See attached Task 1 activity, newsletter and information sheets.

Task 2: "Static Strokes," an AIMS activity. The student will explore static electricity.

See attached Task 2 activity.

Task 3: "Different Strokes," an AIMS activity. The student will experiment with static electricity and research the work of Benjamin Franklin.

See attached Task 3 activity and research prompt.

Task 4: "Balance Your Charge Account," an AIMS activity. The student will play a game reinforcing static electricity concepts.

See attached Task 4 activity.

Task 5: The student will answer an open response question and complete a concept map on the topic of static.

See attached open response item and concept map.

Additional resources:

Video: Ben and Me.

Ranger Rick Big Book : Discovering Electricity

Extensions

More Science at Home

Static

Help your child find various examples of static electricity in your home. Some examples are:

*the "static cling" that occurs between articles of clothing in a clothes dryer

*the attraction of hair to a comb or brush being passed through it

*dust on the surface of a TV screen

*the shock you get when you walk across a carpet and then touch a metal object

*lightning.

Identify examples of static electricity in the home and tell when they occur. Help your child try to explain what causes the buildup of charge.

Current

Try this activity with your child to discover how the electrical devices in your home change electricity into other forms of energy.

Name the devices in your home that are powered by electricity, either from batteries or from household circuit. Discuss with your child that electricity changes into some other form of energy, and how that energy is used. Two examples are given here.

Device	Energy Produced	How Energy is Used
iron	heat	to remove wrinkles
light bulb	heat and light	to supply light for reading

Science Discovery: **Name:**_____

Hairdo Gremlins **Date:**_____

1. What happened to the hair when the balloon was rubbed on the person's head?_____
2. What do you think caused this to happen?_____
3. Describe the behavior of the bubble when the balloon was brought near it.

_____

_____

4. What does this activity show?_____
5. What causes this reaction to occur? Give as much detail as you can. These words may help you: friction, electrons, electrical charge, static electricity.

_____

_____

_____

_____

SCIENCE OPEN-RESPONSE

Write your answer in the space provided on the following page.

Balloon Rub

When a wool cloth is rubbed on a balloon, the balloon "sticks" to a wall for a short time.

a. Why does rubbing the balloon cause it to be attracted to the wall?

b. Why does the attraction stop after a short time?

c. Name two other examples of this type of attraction between objects.

Score	Description
4	The response shows a good understanding of the relationship between rubbing the balloon and the attraction to the wall. There is a clear and accurate description of how static electricity is generated by the movement of electrons and why it stops when the atoms regain their balance. Two other examples of static electricity are named.
3	The response shows an understanding of the relationship between the rubbing of the balloon and the attraction to the wall. There is an accurate description of how static is generated by the movement of electrons and why it stops when the atoms regain their balance. The response includes at least one other example of static electricity are named. The discussion lacks detail or contains minor errors.
2	The response shows a limited understanding of the relationship between rubbing the balloon and the attraction to the wall. The response addresses the question and the is an attempt to describe what causes static or why it stops, and to name one example of static; however, the response contains errors, misconceptions, or omissions.
1	The response shows a minimal understanding of the relationship between rubbing the balloon and the attraction to the wall. The response is incomplete and although there may be an attempt to describe what causes static, explain why it stops, or name one other example, there are major errors, misconceptions, and omissions.

Current

Proposed tasks:

Task 1: "Sparky's Light Kit," an AIMS activity. The student will experiment with a bulb, a D cell, and a large paper clip (or wire) to make a bulb light.

See attached Task 1 activity.

Task 2: "Path Finders," an AIMS activity. The student will learn about complete and incomplete circuits by trying to light a bulb using various systems of bulbs, wires and cells.

See attached Task 2 activity.

Task 3: Conductor or Insulator," an AIMS activity. The student will test a variety of materials to determine if they are conductors or insulators.

See attached Task 3 activity.

Task 4: Make a Switch," an AIMS activity. The student will build simple switches to control the flow of electricity in a circuit. The student will then replace their switch with a real one.

See attached Task 4 activity.

Task 5: : The student will answer an open response question and complete a concept map on the topic of current electricity.

See attached open response item and concept map.

SCIENCE OPEN-RESPONSE

Write your answer in the space provided on the following page.

Turn the Power On

Billy has entered a science fair, and he has decided to enter a project on current electricity. He built an electrical circuit using a battery, three wires, a light bulb and a switch.

a. Draw and label a picture of how his circuit may have looked.

b. Explain why your plan will allow the bulb to light.

Scoring Guide: Turn the Power On

4: The student draws and labels a complete closed circuit using the materials described. The explanation is complete and fully describes the necessity of a closed circuit for the electrons to flow from the negative to the positive side of the battery. The explanation includes the purpose for the switch and how it meets the purpose.

3: The student draws and labels a complete closed circuit using the materials described. The explanation may have minor omissions, but the facts given are correct.

2: The student draws and labels a complete closed circuit. The explanation is correct, but with little detail.

1: The student draws a complete closed circuit. Little or no explanation is given.