ELECTRICITY:
THE "SHOCKING" TOPIC OF OUR "CURRENT" UNIT

Grade Level: First Grade
Written by: Nancy Longworth, Pear Tree Point School, Darien, CT
Length of Unit: 6 Lessons

I. ABSTRACT

Through exploration, experimentation, demonstration, discussion, and direct instruction, first graders will be introduced to the exciting topic of electricity. With a general understanding of the atom gleaned from a previously taught unit on "Matter," the students will gain the knowledge of what electricity actually is, where and how it is produced, and discover its uses in their surroundings. Student safety will be furthered though exposure to this important topic. Finally, students will become familiar with the contributions of Thomas Edison to this area of science.

II. OVERVIEW

A. Concept Objectives
   1. Understand electricity as a form of energy that can occur in nature or be generated by humans.
   2. Recognize that electricity can only travel through certain materials in a complete circuit.
   3. Understand that electricity has four main functions.
   4. Acknowledge a clear set of electrical safety rules.
   5. Become familiar with Thomas Edison's involvement in the early stages of putting electricity to use.

B. Content from the *Core Knowledge Sequence*
   1. Static electricity
   2. Basic parts of a simple circuit (for example, batteries, wire, bulb or buzzer, switch)
   3. Conductive and nonconductive materials
   4. Safety rules

C. Skill Objectives
   1. The student will define electricity.
   2. The student will explain the basic process of electricity production.
   3. The student will identify the parts of a simple circuit and construct an example using these parts.
   4. The student will use a simple circuit to test various materials for conductivity.
   5. The student will locate a circuit in a simple flashlight.
   6. The student will classify the main function of electricity in common household items.
   7. The student will explain the cause of static electricity and use materials to generate it.
   8. The student will generate important safety rules to follow when around electricity.
   9. The student will recognize and recall Thomas Edison's contributions to this topic.

III. BACKGROUND KNOWLEDGE

A. For Teachers
   1. Basic structure of smallest unit of matter, the atom
   2. A general understanding of the production, function, characteristics, and safety of electricity (can be gleaned from the resources provided)

3. Familiarity with the contributions and inventions of Thomas Alva Edison to this field of science (can be acquired through reading the resources provided below)

B. For Students
1. Awareness of smallest unit of matter, the atom, from previously taught First Grade unit.
2. "If at first you don't succeed, try, try again."-First Grade Core Knowledge saying

IV. RESOURCES

A. Berger, Melvin. *Switch On, Switch Off.* New York: Harper Trophy, 1989. ISBN 0-06-445097-X.

B. Cole, Joanna & Bruce Degen. *The Magic School Bus and the Electric Field Trip*. New York: Scholastic Press, 1997. ISBN 0-590-44682-7.

C. Hirsch, E.D., Jr. *What Your First Grader Needs to Know.* New York: Dell Publishing, 1997. p. 317-319. ISBN 0-385-31987-8.

D. Riley, Peter. *Electricity.* New York: Franklin Watts Publishing, 1998. ISBN 0-531-15366-5.

E. "Four Functions." *The Mailbox.* Greensboro, NC: The Education Center, Inc., December/ January 2000/2001, p. 47.

V. LESSONS

Lesson One: What is Electricity? How does it Flow?

A. *Daily Objectives*
1. Concept Objectives
   a. Understand electricity as a form of energy that can occur in nature or be generated by humans.
   b. Recognize that electricity can only travel through certain materials in a complete circuit.
2. Lesson Content
   a. Electricity is a form of energy.
   b. Electrons jump from one atom to the next to produce electricity.
   c. Electricity flows only in a completed circuit.
   d. A simple circuit is made up of a battery (stored up electricity), 2 wires, and a bulb (or buzzer).
3. Skill Objectives
   a. The student will define electricity.
   b. The student will identify the parts of a simple circuit and construct an example using these parts.

B. *Materials*
1. Chart paper and marker
2. Appendix A: "Drawing of Flowing Electrons"
3. For each group of four students:
   a. One small plastic bulb socket and bulb (available at hardware stores or science education supply store or catalog)
   b. Two 8″ insulated wires with the insulation removed from the ends (available at hardware stores)
   c. One D-volt battery (new and intact)
4. Appendix B: "Questions for Oral Review"

C. *Key Vocabulary*
1. electricity - a form of energy caused by the flow of electrons. It can be found in nature or started by humans.
2. energy – force that does work.
3. electron – small particle of an atom.

4. bulb – glass piece that contains the filament, the part that glows when electricity flows through it to produce light.
5. wire – a metal strip (usually copper) that has plastic insulation around it.
6. battery – container of stored-up electricity
7. circuit – a circular connection of an electrical source to something that uses it (i.e. a bulb or buzzer).

D. *Procedures/ Activities*

1. Begin by finding out what information or experiences the students have had with the topic of electricity. This will offer the opportunity later to have children self-assess and evaluate their new knowledge. Ask, "What is electricity?" and record responses offered on chart paper. Other prompt questions might be: "Where do you think it comes from?" "How do we get it?" and "Have you seen it?" Include all correct and incorrect responses, encouraging students that they will discover whether their own ideas are valid over the next few science lessons.
2. Explain that electricity is a form of energy, and that energy does work. The work can be in different forms from making a motor move or making a light shine to making sound come from a radio or heating up the oven.
3. Write the work "electricity" on the board and ask students if they remember a little part of an atom that begins the same way as the word on the board. Try to elicit the word "electron." Explain that electricity occurs when electrons jump from one atom to the next really quickly. Illustrate this on the board (See Appendix A for guidance).
4. Have students act out how electricity happens. Assign children into pairs, appointing one child in each pair to be the "atom" and the other an "electron." If there are an odd number of students, have the extra student start the demonstration as a "loose" electron. The "atoms" should line up shoulder-to-shoulder with their "electron" in front of each of them facing away from them and their hands on the electron's shoulders. Start on one end and explain that the first electron really wants to jump to the next atom. In order to do this, he must force that atom's electron on to the next atom. He does so, then forces the subsequent electrons to continue jumping to the next atom down the line. Encourage children to notice the "flow" of electrons that we call electricity. That flow is called electrical "current," just like the flow of a river is called its current. Students should return to their seats.
5. The next activity is intended to allow the students to discover for themselves that electricity can only do work when it flows in a connected circular shape. Show students a battery (explaining that it has electricity stored inside), two wires, and a bulb in a socket. Tell them that it is their job to get the light bulb to light up using all the materials shown and only those materials. Explain that they need not force anything together, but that rather they'll need the cooperation and participation of their group members to succeed. Divide the class into groups of four (or a number that suits the supply of materials), and supply each group with a set of the materials. Allow the students some time to freely explore and connect the materials in different ways. Subtle hints are allowed after sufficient time. You will know immediately if a group has succeeded due to squeals of delight. Encourage persistence to other groups and note correct placement of materials they've already made. The best advice is that popular saying the students learned in Kindergarten: "If at first you don't succeed, try, try again!"
6. Call upon one student in each group to draw their connected materials on the board. Ask students what shape they see. Write "circuit" on the board and compare to the word "circle." Explain that they've discovered that electricity flows in a circle. It starts at a beginning point (the battery), passes through the wire to the bulb, and must travel back to the battery to make a complete circuit.

7. Collect circuit materials and set aside for Lesson Three preparation.

E. *Assessment/ Evaluation*
1. Students will answer review questions orally (See Appendix B).

Lesson Two: Where Does Electricity Come From?

A. *Daily Objectives*
1. Concept Objectives
   a. Understand electricity as a form of energy that can occur in nature or be generated by humans.
   b. Recognize that electricity can only travel through certain materials in a complete circuit.
2. Lesson Content
   a. Electricity flows in a completed circuit.
   b. A generator starts the flow of electrons.
   c. Large amounts of electricity are generated at a power plant and travel through power lines to reach each student's house and return to the power plant to complete the circuit.
3. Skill Objectives
   a. The student will identify the parts of a simple circuit and construct an example using these parts.
   b. The students will explain the basic process of electrical production.

B. *Materials*
1. For simple circuit construction (one to each student):
   a. Appendix C: "Simple Circuit Cut-outs"
   b. 9x12 piece of construction paper
   c. pair of scissors
   d. glue stick
   e. yellow highlighter, marker, or crayon
2. Book: *Switch On, Switch Off* by Melvin Berger
3. For generator model:
   a. approximately one yard of insulated wire with ends stripped
   b. one magnet rod
   c. one simple flat compass
   d. electrical tape
4. For circuit example (to be constructed prior to lesson):
   a. bulb in socket
   b. two 1-foot pieces of insulated wire with ends stripped
   c. one 3-inch piece of insulated wire with ends stripped
   d. one D-volt battery
   e. one electrical switch (from hardware store or science education supply store or catalog)
   f. screwdriver
5. Appendix D: "Picture Quiz"

C. *Key Vocabulary*
1. electricity - a form of energy caused by the flow of electrons. It can be found in nature or started by humans.
2. circuit - a circular connection of an electrical source to something that uses it (i.e. a bulb or buzzer).
3. generator – machine or equipment that can produce electricity
4. switch – button that controls the ability of electricity to flow, turning items on and off.

D. *Procedures/ Activities*

1. Prior to lesson, construct a model of a switch. Wrap one metal end from each longer wire around the screws on opposite sides of the bulb socket. Secure by tightening with the screwdriver. Fasten one end of one long wire to the screw on one end of the side of the switch in the same fashion. Tape the free end of the other long wire securely on to one end of the battery. Take the smaller wire and tape one end securely to the other end of the battery. Secure the opposite end of the small wire to the free screw on the other end of the switch. When the switch is closed, the light bulb should be illuminated. It should turn off when the switch is open. Leave in the open position until ready to use in the lesson.
2. Review the concept of electricity by asking students what they remember from the previous lesson's activities.
3. Assess the student's knowledge of a circuit and its construction. Distribute the simple circuit cut-outs (Appendix C) and a piece of construction paper to each student. Give directions before they proceed. Tell the students that they should cut out each drawing on the sheet carefully. Next, they will need to arrange the pieces in such a way on the paper so that if real electricity were flowing, one part of the circuit would light up. Each student should raise his hand when he thinks he has succeeded. The teacher should assess each student's model individually, discuss any corrections with the student, and have him glue the pieces down.
4. When all are finished, write the words "bulb," "battery," and "wires" on the board. Students should use the words to label the paper pieces in the completed circuit. Upon completion, students may use a yellow highlighter, marker or crayon to illuminate their paper bulb.
5. Invite students to gather on the carpet for a book about electricity. Read *Switch On, Switch Off* aloud through page 10. Follow step-by-step instructions included in the book to build and demonstrate the model of a generator. Call upon individual students to help with its construction and demonstration. Set aside for further student exploration during free time.
6. Continue reading the book until its end, pausing to review, ask and answer questions, and to further explain any unclear concepts.
7. Demonstrate the concept of a switch with model prepared prior to lesson. Invite students to explain how it works.

E. *Assessment/ Evaluation*
1. Simple circuit construction with paper cut-outs (contained in lesson as review and assessment)
2. Picture Quiz with teacher guidance (Appendix D)

Lesson Three: A Hidden Circuit and Conductivity

A. *Daily Objectives*
1. Concept Objectives
   a. Recognize that electricity can only travel through certain materials in a complete circuit.
2. Lesson Content
   a. Electricity flows only in a completed circuit.
   b. A basic flashlight contains a simple circuit with a switch.
   c. Electricity can only travel through materials that allow it to do so. These are called conductors. Materials that do not allow electricity to flow through them are called insulators.
3. Skill Objectives
   a. The students will locate a circuit in a simple flashlight.
   b. The students will use a simple circuit to test various materials for conductivity.

B. *Materials*

1. one simply constructed flashlight per student or pair of students.
2. Appendix E: "Flashlight Request Note" to go home with each student approximately a week prior to this lesson
3. Appendix F: "A Flashlight Circuit" sheet
4. one enlarged copy of Appendix F for the board
5. colored pencils
6. yellow highlighter, marker, or crayon
7. For each group of approximately four students:
   a. one teacher-prepared test circuit (using circuit materials from Lesson One plus one additional 8-inch wire and screwdriver)
   b. one Ziploc plastic bag containing a key, piece of aluminum foil, a nickel, wax paper, a plastic spoon, a ball of clay, a cork, and a nail
8. Appendix G: "Materials Classification Sheet"
9. an assortment of readily available conductors and insulators to total the number of students in the class. Possibilities include: a rubber band, metal barrette, metal fork, piece of foam, piece of construction paper, penny, dice, aluminum soda can, glass jar and its metal lid, Tupperware container, paper clip, or bouncy rubber ball.

C. *Key Vocabulary*

1. circuit- a circular connection of an electrical source to something that uses it (i.e. a bulb or buzzer).
2. conductor- a material that allows electricity to flow through it.
3. insulator-a material that does not allow electricity to flow through it.

D. *Procedures/ Activities*

1. One week prior to lesson, send the "Flashlight Request Note" (Appendix E) home to each student. Store flashlights until day of lesson.
2. Prior to this lesson, prepare the conductivity circuits. Wrap one of the ends of two separate wires around the screws on opposite sides of the bulb socket. Secure with a screwdriver. Attach the opposite end of one of those wires to one end of the battery by securing it with electrical tape. Attach one end of the third wire to the other end of the battery with electrical tape. There should be a gap between this wire and the wire coming from the bulb. Prepare the other circuits in the same fashion and set aside for use later in the lesson.
3. Start the lesson by explaining that the students will try to find out how a flashlight works.
4. Distribute one flashlight to each student. Demonstrate that the top part can be unscrewed to find the batteries. Caution the students that the top piece does contain a fragile glass bulb. Allow the students to explore the flashlight's inner workings and explain to their peers when they think they've figured out where the circuit is and how and why the light works when switched "on."
5. Review the flashlight circuit on "The Flashlight Circuit" sheet (Appendix F). Place an enlarged copy of Appendix F on the board. Distribute one copy of Appendix F to each student. Students should trace along the circuit path with a colored pencil on their own sheet as the teacher explains. Begin at the positive end (+ sign) on the top battery and draw the path of the electricity through the coil, through the filament (wire in bulb), down the metal strips, past the switch, around to the end of the flashlight, and back up through the negative (-) and positive (+) ends of the battery to the starting point.
1. Write the words "bulb," "battery," and "switch" on the board. Students should label the three parts appropriately and color code the box that identifies the flow of electrical current. Collect.
2. Divide the class into small groups (according to the supply of materials) and distribute one conductivity test circuit to each group along with one plastic bag

containing the test items and a "Materials Classification" sheet (Appendix H). Review that electricity must flow in a circuit, but introduce to students that it can't just flow through any materials around. Only specific materials will conduct electricity. These are called conductors (I always explain that these are just like the conductor of an orchestra-they guide the electricity just as the musical conductor guides the music being played). Other materials will not. These are called insulators. Explain that they will test certain items to see if they are conductors or insulators. If the bulb lights up, the electricity is flowing.

3. Assign the order of turns in each group. One item at a time, the students should take turns placing the item in the opening of the circuit. Students should be sure to place one wire at one end of the item and the other at the opposite end such that the wires themselves don't touch. Encourage the students to form hypotheses about which items will conduct electricity and which will not prior to testing the latter items. The students should record the names of the items in the appropriate category on the classification sheet (I usually write the names of each item on the board prior to this activity so that students might refer there for proper spelling). Discuss the results. Collect materials and keep them available to students for further exploration during free times.

E. *Assessment/ Evaluation*

1. To assess the students' understanding of conductors and insulators, hold up an item from the collected assortment. Ask the student to classify the item as a conductor or insulator. If an incorrect response is given, have the student test the item to clarify his understanding. Hold up a different item for each student.

Lesson Four: What Does Electricity Do for Us?

A. *Daily Objectives*

1. Concept Objectives
   a. Understand that electricity has four main functions.
2. Lesson Content
   a. We have developed ways to use electrical energy to do four main jobs: make heat as in an oven, make light as in a bulb, make sound as in a radio, and cause motion as in a fan.
   b. Most household appliances use electricity in order to produce one of these four main functions.
3. Skill Objectives
   a. The students will classify the main function of electricity in common household items.

B. *Materials*

1. Appendix H: "Household Electrical Appliances" recording sheet
2. Appendix I: "Note to Parents" explaining the purpose of recording a list of household electrical appliances
3. Book: *The Magic School Bus and the Electric Field Trip* by Joanna Cole and Bruce Degen
4. Appendix J: "Four Functions" booklet
5. scissors

C. *Key Vocabulary*

1. function- for what and why something is used

D. *Procedures/ Activities*

1. One week prior to the lesson, send home a copy of Appendix I attached to a copy of Appendix H with each student. Collect and prepare these for the lesson. In the blank space on the top right, write "Function of Electricity." Underneath this title, there are four spaces for the categories: "heat," "light," "sound," and "motion." Write these titles in the spaces and save for use in the lesson.

2. Begin by explaining to the students that since they now know what electricity is, where it comes from, and what materials it can flow through, they are now going to learn about ways in which they use electricity.
3. Read aloud *The Magic School Bus and the Electric Field Trip*. The first half of this book reviews the concepts and facts contained in the first three lessons. As most students thoroughly enjoy this book, I recommend reading it in completion. However, in the interest of time, the teacher may explain that Ms. Frizzle and her class are traveling in an electrical power line and begin reading on page 28.
4. Review the three main ways in which electricity was used in the book: to produce light in the lamp at the library and Grandpa's TV, to make heat in the toaster at the restaurant, and to cause motion as in the power saw and vacuum. Explain that the noise made by the saw and vacuum (or in such things as a hairdryer or fan) is not the main job of the electricity, but just a result of the motors running. Electricity can, however, be used to make sound as in a radio or alarm system.
5. Distribute the students' "Household Appliance Sheets" on which they have recorded items in their homes that use electricity. Please note that if requiring students to complete this part of the activity at home poses problems, this sheet can be completed at school as a class. Note that the teacher has written the four main functions of electricity. Students are to place a check in the box that tells for what purpose that appliance mainly uses the electricity. I usually call upon many students to tell one of the appliances they have recorded and classify the function of electricity together as a class. Since many students often have the same appliances as each other, this is a good way to get the students started. Allow students to complete the rest on their own, monitoring their choices individually and discussing any corrections directly with each student. Collect.

E. *Assessment/ Evaluation*

1. Make "Four Functions" booklet. Distribute one copy of Appendix J to each student. Cut along solid black lines and place pages in numerical order. Staple twice at the top for each student. Write the words "motion," "sound," "light," and "heat" on the board. On pages 1-4, students should choose one or two of these words to complete the sentences. Two of these items use electricity to do two functions. On pages 5-8, students need to think of another appliance that uses electricity to produce light, heat, sound, and motion.

Lesson Five: What is Static Electricity?

A. *Daily Objectives*

1. Concept Objectives
   a. Understand electricity as a form of energy that can occur in nature or be generated by humans.
   b. Acknowledge a clear set of electrical safety rules.
2. Lesson Content
   a. Static electricity is a different kind of electricity, but it does not flow from atom to atom. Static means it stays in the same place.
   b. Static electricity occurs when one material rubs against another material and loses some of its electrons. It gets a positive charge (+) of static electricity. The material that gained its electrons now has a negative charge (-). One can see this static electricity jump (like when one shuffles across a rug and gently touches another person or when lightning jumps between clouds or to the ground) or attract the opposite charge as in the experiments conducted in this lesson.
3. Skill Objectives
   a. The students will explain the cause of static electricity and use materials to generate it.

B. *Materials*
   1. Book: *Electricity* by Peter Riley
   2. a few balloons already blown up and tied
   3. a wool sweater or pants (I usually wear one of these on this day as I usually teach this unit in the winter time) or piece of wool fabric (from a fabric store)
   4. For Station One:
      a. small, plastic combs
      b. small pieces of wool
      c. tissue paper or Kleenex tissue that has been cut into small bits
      d. pieces of Puffed Wheat or other puffed cereal
   5. For Station Two:
      a. two balloons already blown up and tied
      b. two pieces of wool
   6. For Station Three:
      a. one balloon already blown up and tied
      b. construction paper
      c. scissors
      d. pencil
      e. piece of wool or wool sweater or pants

C. *Key Vocabulary*
   1. static electricity- a build-up of charge when some material loses or gains electrons
   2. positive charge- a lack of electrons
   3. negative charge- a gain of electrons

D. *Procedures/ Activities*
   1. Begin by reviewing how people make electricity at power plants. Explain that it is the type of electricity that flows in a current. Introduce that there is a kind of electricity that does not move, rather it stays still or "static." It is called "static electricity."
   2. Read pages 24-25 in Peter Riley's book *Electricity*.
   3. Demonstrate how a balloon gains electrons when it is rubbed against a wool sweater or pants. Since the sweater has lost electrons, the two materials now have opposite charges and attract each other. The two will cling together.
   4. Divide the class into three groups. One group will start at Station One, one at Station Two, and the last with the teacher at Station Three. The students should rotate from station to station until all three activities have been performed.
   5. At Station One, the students will rub a comb's bristles with a piece of wool briskly. Then, quickly hold the comb over the bits of tissue paper or Kleenex tissue and observe the results. (They should attract to the comb since they have acquired a positive charge and the comb has gained electrons to acquire a negative charge, hence "opposites attract.")
   6. At Station Two, the students should work in pairs, and the pairs should take turns. Each member of a pair should take hold of one of the balloons and rub it against a piece of wool. Then, the students should try to bring the two balloons together and observe the results. (Since both balloons have gained electrons from the wool and each acquired a negative charge, the two balloons will repel each other.)
   7. At Station Three, the teacher should demonstrate "Jumping Jacks." Prior to the lesson, draw and cut out of the construction paper approximately ten one-inch tall people. Place these people on a hard cover book on the floor or tabletop/desktop. Rub a balloon with a piece of wool or on a woolen sweater or pants. Hold the balloon a little ways above the people (about 3-4 inches). Watch the "Jumping Jacks" as they jump up to the balloon and fall back down. Some might even

dance and twirl around. Explain that the balloon gained a negative charge when it gained some electrons from the wool material. It attracted the "Jacks." After a while, however, the "Jacks" gained back some electrons from the balloon and began to be repelled. Thus, they jump back and forth.
**Please note that moisture and heat affect these experiments adversely.

8. Upon completion of the three stations, students should return to their seats. Discuss the results.
9. Read and discuss pages 26-27 of Riley's *Electricity*. These pages discuss where static electricity occurs in nature.

E. *Assessment/ Evaluation*
1. Students will answer review questions orally (See Appendix B).

Lesson Six: Who was Thomas Edison? How do we Keep Safe?

A. *Daily Objectives*
1. Concept Objectives
   a. Become familiar with Thomas Edison's involvement in the early stages of putting electricity to use.
   b. Acknowledge a clear set of electrical safety rules.
2. Lesson Content
   a. Thomas Edison was known as the "Wizard of Menlo Park." His two most important inventions were the phonograph and the light bulb.
   b. There are very important rules to remember for your safety when working with or around electricity. "Never put anything else besides a proper electrical plug into an outlet or bulb into a socket." "Don't touch any electrical appliance when your hands are wet; Electricity and water don't mix!" "Never use appliances with a damaged cord." "Steer clear of power lines that have fallen." "Stay inside or in a car during a lightning storm." "Always ask an adult for help with anything electrical if you are unsure if it is safe."
3. Skill Objectives
   a. The student will recognize and recall Thomas Edison's contributions to this topic.
   b. The student will generate important safety rules to follow when around electricity.

B. *Materials*
1. Appendix K: Thomas Edison Research Note
2. Book: *What Your First Grader Needs to Know* by E.D. Hirsch
3. construction paper (12X18)
4. white paper (11X17) with writing lines drawn
5. markers or colored pencils
6. pencil

C. *Key Vocabulary*
1. invention- something completely new that we can use

D. *Procedures/ Activities*
1. Prior to this lesson and with plenty of time allotted, send home a copy of Appendix K with each student requesting that they try to find out about why Thomas Edison was an important man in the field of electricity. I always try to have a piece of every unit that I teach come from the students' efforts at home with their parents. I also allow some opportunities for students to use the resources in our classroom for exploration. However, I understand that this opportunity does not exist or would be complicated and undependable in varying communities. There are many children's books on Thomas Edison along with

the narrative in Hirsch's *What Your First Grader Needs to Know*. Please substitute for, or accompany these with, this lesson.

2. Invite any student who has learned something about Thomas Edison to share it with the class. Record important facts on the board. Draw inventions and pictures to assist students in their understanding. To summarize, read the information in Hirsch's *What Your First Grader Needs to Know*.
3. Explain that now that the students know so much about electricity that it is important to know some safety rules when around or working with electricity. Encourage the students to think of some rules they remember hearing either from their parents or from the books the class has read together. Write clearly stated rules on the board. Try to elicit the rules from the "Lesson Content" section above.
4. Make "Electrical Safety" posters. Distribute a sheet of 11X14 lined white paper and a sheet of large construction paper to each student. Students should choose at least three rules from the board to write onto their lined, white paper. Glue the white paper onto the construction paper and have students illustrate the rules being followed in the bordering space around the white paper. If it is anticipated that the writing part will be difficult and complicated, type up the rules stated in the "Lesson Content" section and copy for each student to glue in the center of their poster. Illustrate as above.

E. *Assessment/ Evaluation*

1. The student illustrations should demonstrate their understanding of particular electrical safety rules.

VI. CULMINATING ACTIVITIES

A. Review initial assessment list. Ask students if they remember when they were asked what they already knew about electricity. Post this list on the board. Examine the statements written one-by-one. This allows the students the opportunity to assess their original thinking, confirm the accuracy (or inaccuracy) of any information, self-correct any errors, and generate new knowledge gleaned from this unit.

B. An additional culminating activity might be a field trip to a nearby power plant. While most power plants are not conducive or safe for young students, there are some power plants that have special walk-ways and personnel that can guide tours for school-age children.

C. Have a "Share the Knowledge" session with another grade level within the school. Our first graders are given the opportunity to choose one particular detail about the topic of electricity and share or demonstrate it with their "third-grade buddy." This is a remarkable way to assess learning and assimilation of new information.

VII. HANDOUTS/ WORKSHEETS

A. Appendix C- Simple Circuit Cut-outs
B. Appendix D- Picture Quiz
C. Appendix E- Flashlight Request Note
D. Appendix F- A Flashlight Circuit
E. Appendix G- Materials Classification Sheet
F. Appendix H- Household Electrical Appliances
G. Appendix I-Note to Parents
H. Appendix J- "Four Functions" booklet
I. Appendix K- Thomas Edison Research Note

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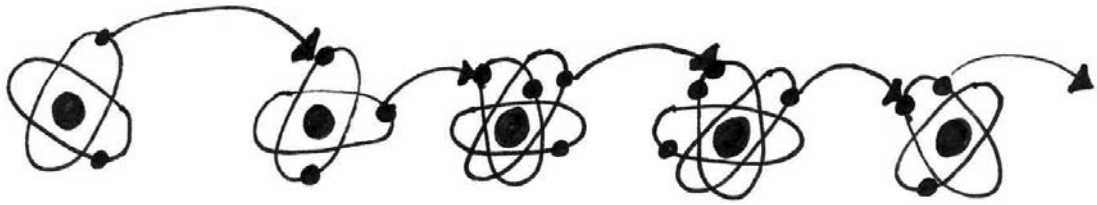
Appendix A
Drawing of Flowing Electrons



Appendix B
Questions for Oral Review

After Lesson One

1. What jumps from atom to atom to make electricity? (electrons)

2. What does current mean? (flow or movement of electricity)

3. What do we call a circle of electrical current? (circuit)

4. What parts make up a simple circuit? (2 wires, bulb, and a battery)

5. What happens if a circuit is not completed? (the electricity cannot flow; the bulb won't light up)

6. Where do you think electricity comes from? How do the electrons start flowing? (Entertain a few ideas and explain that they'll learn the answer in their next science lesson.)

After Lesson Five

1. How is static electricity different from current electricity? (It stays in the same place and does not flow.)

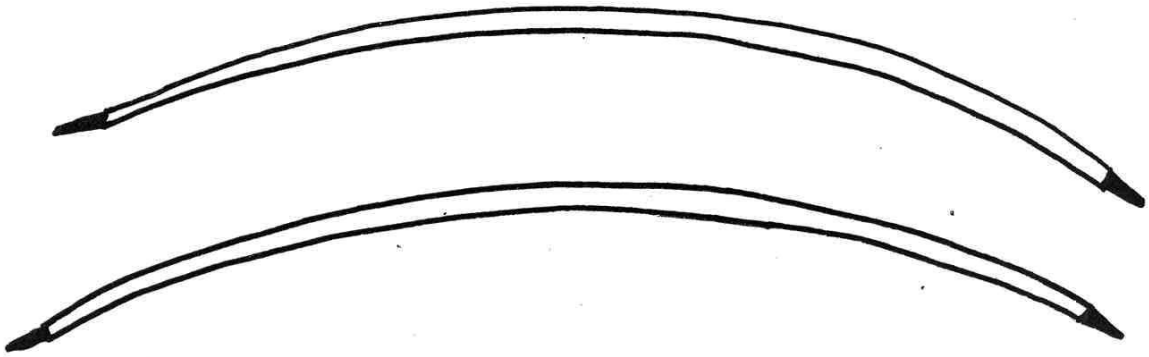
2. If a balloon has a negative charge and your hair has a positive charge, what will happen? (Your hair will be attracted to the balloon and stick up.)

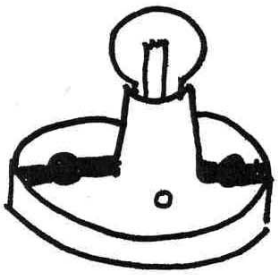
3. If two materials have the same charge, what will happen? (They will push away from, or repel, each other.)

4. Do you think the comb's negative charge could attract a positively charged large chunk of styrofoam? (Probably not since the charge would not be strong enough to lift the weight of the Styrofoam. If there were small pieces of Styrofoam, it would work.)

5. Name two examples of static electricity in nature. (electric eel, lightning, impulses in the nervous system)

Appendix C
Simple Circuit Cut-outs





Appendix D
Picture Quiz

Name _____ Date _____

Circle the correct pictures and words to answer each question.

1. Electricity is the flow of...

electrons

water

wind

2. Electricity must flow in what general shape?

horseshoe

zig-zag

circle

3. Circle the parts of a simple circuit:

wire

battery

flashlight

bulb

4. What machine produces electricity?

lawn mower

fan

power plant

Appendix E
Flashlight Request Note

Dear First Graders and Parents,

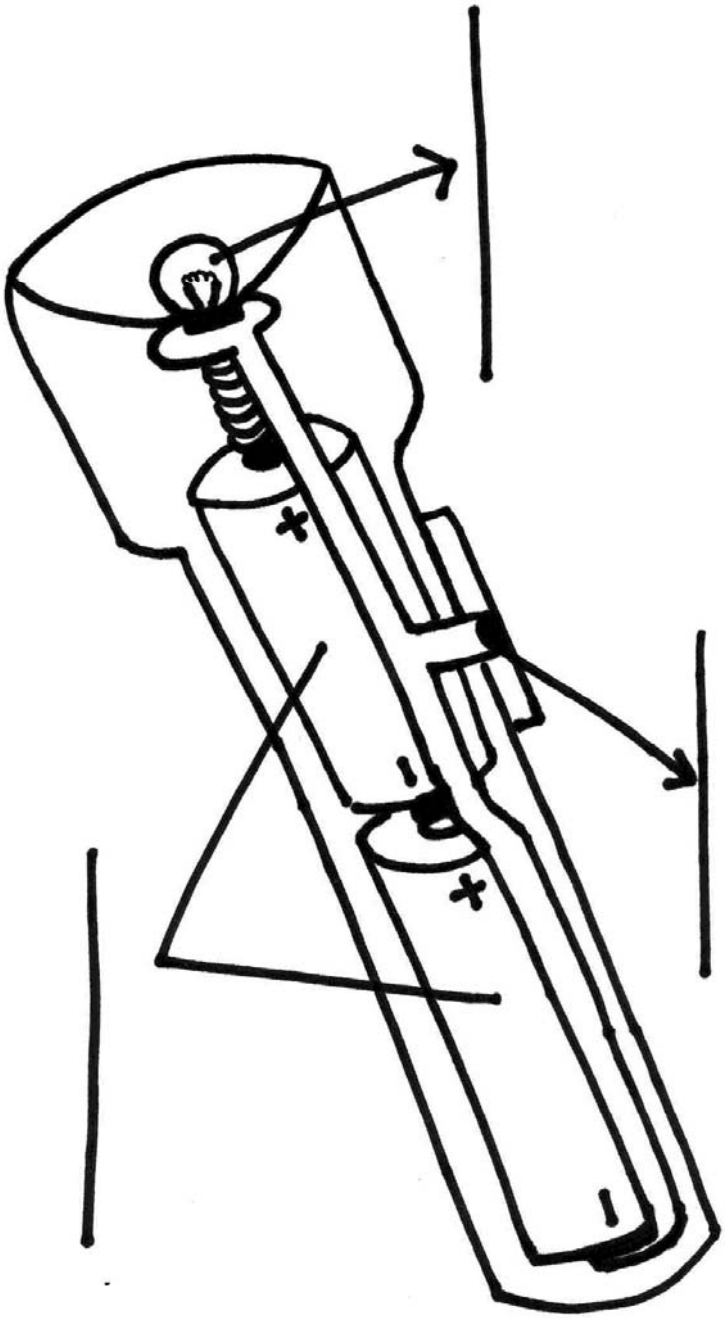
We have begun our exciting unit on electricity! Next week, we will be using flashlights for a special project. Please bring in one simple, working flashlight (the cheap, plastic kind preferably) by **MONDAY**. You don't need to go out and buy a new one; we have some extras available at school. They will be returned by the end of the week!

Thanks!
First Grade Science Teacher

Appendix F
A Flashlight Circuit

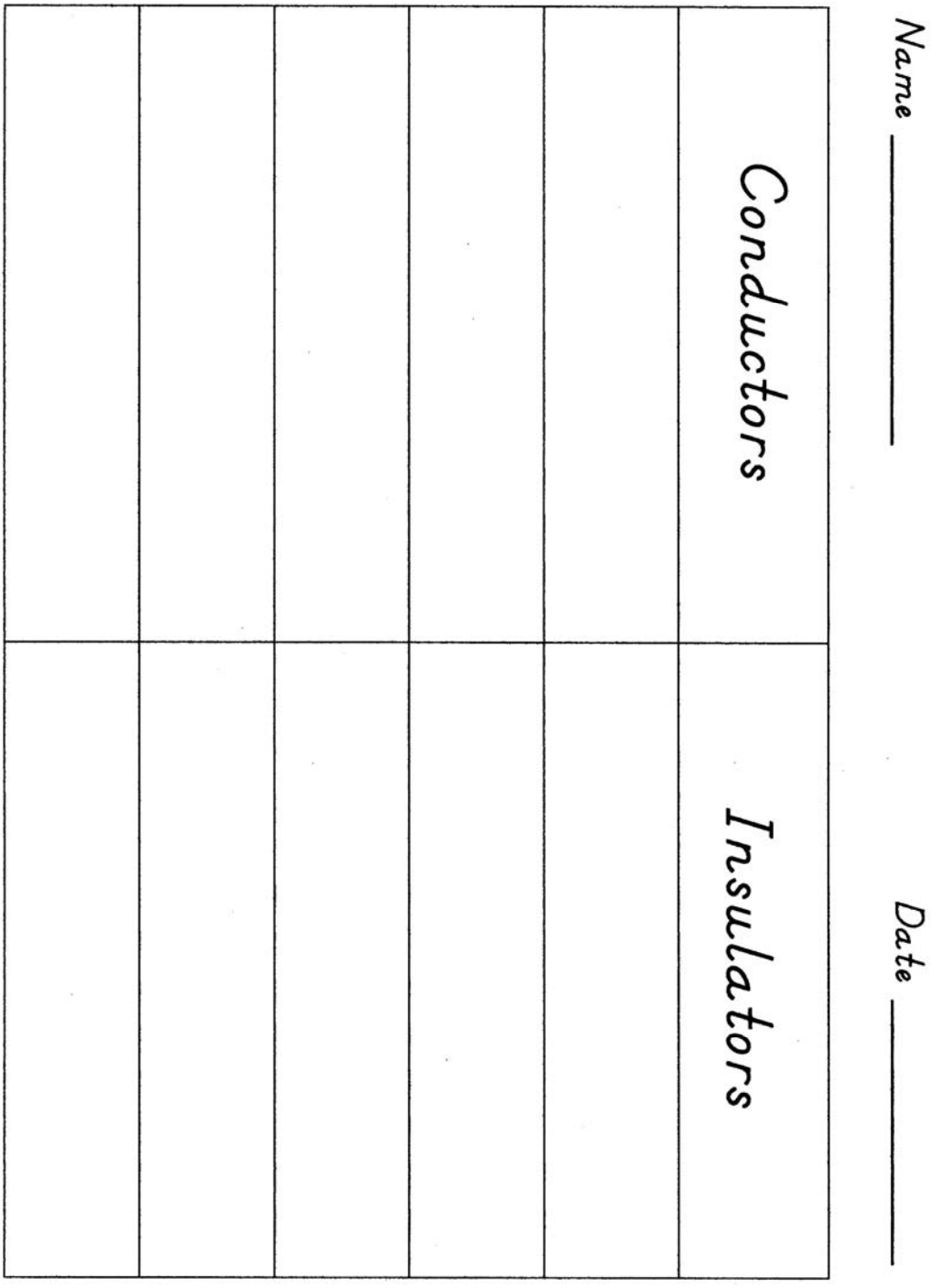
Name_____ Date_____

A Flashlight Circuit



= flow of electrical current

Appendix G
Materials Classification Sheet



Appendix H
Household Electrical Appliances

Name _____ Date _____

Electrical Household Items				

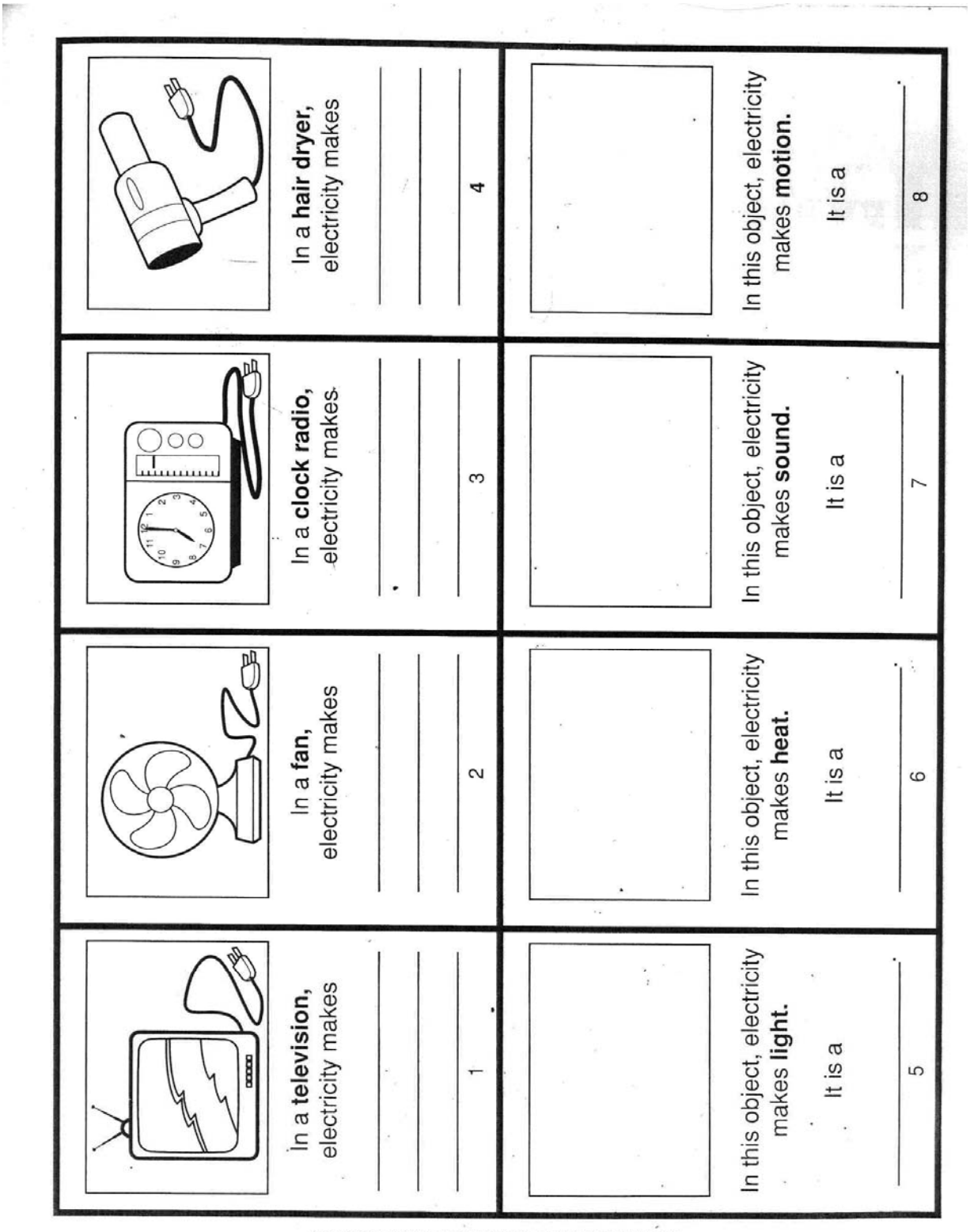
Appendix I
Note to Parents

Dear First Graders and Parents,

Over the next week, please hunt around your house with an adult to find 10 objects that use electricity. Be sure to list them on the left side of the orange sheet of paper. We will be learning about how and why these objects use electricity next week, so be sure to bring it back! Always remember our important electrical safety rules as you search.

Thanks!
First Grade Science Teacher

Appendix J
"Four Functions" booklet



Appendix K
Thomas Edison Research Note

Dear First Graders and Parents,

As you know, we have begun our study of electricity. **Thomas Edison** was a very important man in this field. Here is your chance to find out **WHY**! You may use books from your house, a friend, or the library, use resources on the computer, or watch a video or a television program. You may ask mom or dad to help you in your research efforts, but it will be no fun if they just tell you the answer. You will be doing one of the most important jobs of a true scientist: **GATHERING INFORMATION**! Be sure to write down any information you find out or print it out (and READ it) and bring it back to school by the end of next week!

GOOD LUCK!
Your First Grade Science Teacher