

i3 STC Kit Extension Activities

North Carolina

Grade: 4th

Kit Name: Electrical Circuits

Essential Standard(s): (List number, standard, clarifying objectives where appropriate)

4.P.1 → Explain how various forces affect the motion of an object.

4.P.1.1 Explain how magnets interact with all things made of iron and with other magnets to produce motion without touching them.

4.P.1.2 Explain how electrically charged objects push or pull on other electrically charged objects and produce motion.

4.P.3 → Recognize that energy takes various forms that may be grouped based on their interaction with matter.

4.P.3.1 Recognize the basic forms of energy (light, sound, heat, electrical, and magnetic) as the ability to cause motion or create change.

4.P.3.2 Recognize that light travels in a straight line until it strikes an object or travels from one medium to another, and that light can be reflected, refracted, and absorbed.

3.P.3 → Recognize how energy can be transferred from one object to another.

3.P.3.1 Recognize that energy can be transferred from one object to another by rubbing them against each other.

Language Arts

1. *4.RL.4 Determine the meaning of words and phrases as they are used in a text, including those that allude to significant characters found in mythology (e.g., Herculean).*
2. *4.RFS.4 Read with sufficient accuracy and fluency to support comprehension.*
3. *4.RIT.2 Determine the main idea of a text and explain how it is supported by key details; summarize the text.*

Writing

1. *4.W.4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)*
1. *4.L.2.1 Use correct capitalization.*
2. *4.L.2.4 Spell grade-appropriate words correctly, consulting references as needed.*

Unpack the Standard (What does it mean?? What is the “Big Idea”?):

4.P.1 → Magnets and electricity can produce motion.

4.P.3 → Energy has lots of different forms and it can make things move or change.

3.P.3 → Energy can move from one thing to another.

Electricity and magnetism make up different systems. The main idea to convey here is that forces can act at a distance. Students should carry out investigations to become familiar with the pushes and pulls of magnets. Students should also investigate to gain an understanding of electrically charged objects exert a push or a pull on other objects.

Electricity is also related to other systems such as magnetism and weather.

What is the Engaging (will get the student interesting) Essential Question that the students will be trying to answer as a result of this Extension?

What are the different types of energy?

What do they do?

Which activities in the kit touch on the Standard(s) and how can they be adjusted to better address the Standard(s)?

* In the kit, lesson 8 (Making a Filament) fits under Sub-concept 3: Electricity flowing through a circuit may produce heat and light. This extension activity could be placed there, but it doesn't flow smoothly. It would fit better at the end of the unit as a culminating activity showing what electrical energy compared to other types of energy can do.

Kit Activity (Lesson 8 or end of kit)	Extension Suggestions (See lesson below.)
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*Before the lesson, have the students put together mini-booklets for copying down their observations. Students title the outside, "My Energy Observation Booklet".

VOCABULARY:

Attract - when two objects are pulled together

Circuit - a complete path that electricity can move through

Closed circuit - a clear and complete path that electricity can flow through

Conductor - a material through which heat or electricity flows easily

Current electricity - a moving electrical charge

Discharge - when a buildup of electrical charge empties into something

D-cell - a battery that changes chemical energy into electrical energy

Electrical charge - the positive or negative property of particles

Electricity - the energy caused by the flow electrical charges

Electromagnet - a temporary magnet created when current flows through wire wrapped in coils

Force – a push or pull by one object to move another

Grounded – when an electrical charge that flows into the ground, or surface of the earth

Insulator – a material through which heat or electricity does not flow very well

Lightning – a discharge of static electricity from a thundercloud

Magnetic field – a region of magnetic force around a magnet

Open circuit – a broken or incomplete path that electricity cannot flow through

Parallel circuit – a circuit in which each electrical device is independently connected to the electrical source

Resistor – property of a material through which electricity has difficulty flowing

Series circuit – a circuit in which the current must flow through each electrical device in order to complete the circuit

Static electricity – a build up of an electrical charge

Switch – a device that can open or close a an electrical circuit

Teacher prep for stations:

Station	Description
Electrical Energy	<ul style="list-style-type: none">Have materials for a circuit at this center. This circuit will include a small motor and a plastic disc that will rotate. Students will make observations about what happens with the motor and disc once the circuit is completed.
Magnetic Energy	<ul style="list-style-type: none">At this center, set up plastic wand magnets at a table, along with miscellaneous magnetic/non-magnetic objects. Students will make observations about magnetic/non-magnetic objects, and the pulling movement that can take place when the magnet is placed under the table.
Energy Transfer	<ul style="list-style-type: none">At this center, have several balloons blown up. Students should rub a balloon on their head and records what happens when they hold it near their hair. They should also record what happens when they touch it to the wall. They can test it with other things as well.
Heat Energy	<ul style="list-style-type: none">Have enough ice cubes (or Hershey's Kisses) for each student, each placed inside an individual baggie. (Store these in a cooler or lunchbox.) Students will race to determine who can melt their ice cube or chocolate the fastest. Students will make observations on which method was the fastest, as well as the number of minutes/seconds it takes to melt the object.
Sound Energy	<ul style="list-style-type: none">At this center, place miscellaneous items inside paper towel rolls, wrapped in wrapping paper or the paper from a paper bag. Students will shake the tubes, trying to make educated guesses as to which items are in which tube. (Number the tubes beforehand—giving a key for the kids to check their answers at the end.)
Light Energy	<ul style="list-style-type: none">At this center, provide students with a flashlight and a variety of shiny objects, opaque objects, and clear objects. Include a mirror and a prism. Students will make observations about how the light acts when it hits the different items.

Lesson Introduction- (APK) Ask students to think of the biggest appliance in their kitchens—the refrigerator. What is the refrigerator/freezer used for? --To keep things cold/frozen. Tell the kids that this is one type of energy, heat energy, (believe it or not) is used to keep things cold and frozen. Explain that there are four other types of energy that we will discover today, that are all used up in/on a refrigerator. Have the kids discuss what the four other types of energy these could possibly be. Based on student responses, guide them into understanding that they will explore electrical, magnetic, sound, light, and heat energy today. They will also explore how energy can move from one thing to another.

Active Participation- Students will work in groups to complete the activities/observations at each center.

Closure- Have students share their observations with students other than those in their groups. Pick a few

items to review whole-class, such as what items were magnetic/non-magnetic, what the black and white object is at the electricity center, or even which items had certain reactions to light. End the lesson by having kids turn and talk to their shoulder partner about which type of energy they thought was most interesting, and they would like to research more about.

***Place the following questions at each station to guide the students in making their observations. *You may need to alter these, based on the specific items you have on hand.**

Electricity Station:

*At this center, you will be making observations about what happens when a circuit is completed.

Step 1: Place the cell inside the cell holder.

Step 2: Attach the red wire to the Fahnestock clip.

Step 3: Place the green butterfly disc on the long silver post on the white and black object.

Step 4: Attach one end of the white wire to the other Fahnestock clip.

Step 5: Observe what happens.

- **Write down what you observed happening once you completed the circuit.**
- **What do you think the white and black object is?**
- Where else might you see the black and white object being used?

Light Station:

Vocabulary to know and understand: **Reflecting** means the light bounces off of an object. Light **absorption** means the light does not reflect off the object, it is almost as if the light is captured in the object. **Refraction** means that light goes through an object and spreads out on the other side.

*At this center, you will be making observations about what happens when light is shined on different objects.

Step 1: Turn on the flashlight. Shine the light on each object and make observations on whether the light *reflects, absorbs, or refracts* from the object.

Step 2: Make an H-chart. **Fill in the chart with the names of the objects that reflected, absorbed, or refracted light.**

Reflected	Absorbed	Refracted

Step 3: Think about your parents' car or truck. **Discuss items on a car or truck that reflect, absorb, or refract light. At the very bottom of your chart, draw a horizontal line; list the items you discussed that are found on cars or trucks.**

Sound Station:

Information to know and understand: Sound is a form of energy. All sound is caused by vibrations.

*At this center, you will be making observations about different sounds. You will try to guess which vibrations are coming from which objects inside the mystery tubes.

Step 1: Shake each mystery tube and try to figure out what is inside just by the vibrations you hear.

Make a chart like this on your paper.

Buttons	Rocks	Toothpicks	Coins	Paper clips

Step 2: When do you think it would come in handy to recognize certain sounds? **Discuss this, and write down what you discussed on your paper.**

Magnetism Station: 4.P.1

*At this center, you will be making observations about magnetic and non-magnetic items. (Items that are attracted to magnets and items that are not attracted to magnets.) You will also be making observations about what magnets can do from a distance.

Step 1: **Make a T-chart. Label one side "magnetic." Label the other side "non-magnetic."**

Step 2: Choose a magnet. Hold it by the handle.

Step 3: Pick an object to focus on first. Place the objects on top of the table

Step 4: Place magnet wand underneath the table. Move your wand around under the table.

Step 5: Observe the objects to see what happens. Write down what happens to the objects when you move your wand around.

Step 6: Each time you complete step 3-6, fill in the T-chart with the object name.

Step 7: Once all objects have been tested by each group member, discuss what all of the magnetic objects have in common.

Extra Activities with 4P1 Magnets Interaction

<http://www.learnnc.org/lp/pages/3895?ref=search>

Students will explore and experiment with a magnet's mysterious invisible strength by rotating through five hands-on centers.

Format: lesson plan (grade 4 Science)

Heat Station:

*At this station, you will explore what heat is able to do.

*Each person in the group will race against each other to see who can melt their ice cube first. You can try different methods like holding it in your hands, blowing on it, rubbing it in your hands, or whatever else you think might work! *Do not take your ice cube out of the bag. Keep it in the bag the entire time!*

Step 1: Take a plastic bag out of the cooler.

Step 2: Race your group mates to see who can melt their ice cube first. *Use the stop watch to time it!

Step 3: **Write down what method(s) you used and if these methods worked or not. Write down what time it took to melt your ice cube.**

Step 4: **One the game is over, discuss different ways heat energy is used in your home. At the bottom of your booklet, list the ways heat energy is used in your home.**

Energy Transfer Station:

*At this station, you will explore how energy moves from one thing to another just by rubbing them against each other.

*Each person in the group should pick up a balloon. Touch it to your head, but don't move it. **Record what happens.** Next, rub the balloon on your hair. (Do not pop the balloon!) **Record what happens to your hair.** Rub it on your hair again. Then, touch it to the wall. What happens?

This is called Static Electricity. The energy moves just by rubbing the balloon on your hair! Try rubbing and sticking the balloon on other objects, but be careful not to pop the balloon!

LITERATURE CONNECTIONS:

Additional Suggestions (Literature connections; online resources):

1. Teacher will show the video "Magnet Mania" to the students. Reminding them to think about the six basic signal words when you are writing a summary.
2. After the video, students will write a summary answering who, what, where, when, why, and how.
3. Students then pair up and read their summaries to each other.
1. [Magnet Module Lesson](#)- Magnet module questions- Vocabulary matching activity/magnet sort game
2. [Magnetism Book](#)- This is on readingAtoZ.com Most schools have an account for this website.

3. [Smart Exchange-electricity and magnetism](#)
4. [Magnet Video](#)- Magnet mania short video
5. [Review and Assessment](#) - This is on teacherspayteacher.com You have to have an account which is free to download the materials.

More Resources

1. [North and South Poles Song](#)- teaches students the poles of a magnet.
2. [Magnet Poster](#)- Shows magnets with opposite poles and same poles
3. [Magnetism Word Search](#)
4. [Another Magnetism Word Search](#)
5. [Student Magnet Review Book](#)
6. [Magnet Centers](#)

<http://www.sciencekids.co.nz/experiments/staticelectricity.html> --> extension activity for static electricity

<http://www.ducksters.com/science/light.php> --> explains things about light (including refraction through a prism)

http://www.eia.gov/KIDS/energy.cfm?page=about_forms_of_energy-basics → This site would be good for an advanced student. It discusses heat (thermal), motion, electrical, and sound energy, as well as several other types that we did not explore in this activity.

<http://www.livebinders.com/play/play?id=478141>

<http://www.livebinders.com/play/play?id=478141>

In this set of experiments, students will investigate Mother Nature's most fun play things: magnets. Students will observe and demonstrate opposite poles: North/South. They will discover that magnets can "repel" or "attract" depending on which pole are facing each other. Students will observe through investigative activities how a natural force is created by two magnets and answer the question, "Can I block this force that is being created?" Students will use science journals to summarize, question for future investigations, and make predictions they hope to see answered in the future.

<http://howthingsfly.si.edu/forces-flight/four-forces>

Site from the Smithsonian Air and Space Museum where you will find interactive activities, students can submit their own questions and other "expert" students will answer them. Short videos to explain force and motion.

Writing Connection:

Creating Questions/Presentations

1. Student groups will create their question.
2. Student groups will present their summary to the class.
3. The audience will write their answer to the posed questions from the presenting group.

Magnet Poles

1. Teacher will split students up into groups
2. Each group will get a copy of the book Magnetism by Elizabeth Austin (Found on A to Z.)
3. Teacher will read aloud the book Magnetism by Elizabeth Austin (Found on A to Z.) while the student pairs are following along with their book.
4. Teacher will review how to create a summary using the 6 basic signal words.(Finding the who, what, when, where, why, and how.)
5. Teacher will pass out the 6 basic signal words graphic organizer for students to use when creating their summary.

Teacher will assign a chapter to each group. Each group will be responsible for creating a summary based on their assigned chapter.. They will also be responsible for presenting their summary to the class the following day

Students' work:

1. Students will be split into groups.
2. Students will be given a Magnetism book and will follow along and listen as the teacher reads to them.
3. Students will listen and participate in conversation on how to create a summary using the 6 basic signal words.
4. Students will be given a chapter to create their own summary.
5. Students will use a graphic organizer with the 6 basic signal words in order to create their summary.