

CIC Lesson Plan

Lesson Name Electricity and Magnetism: From Fun to Function

Developed by Kalil Oldham

For Grade 4

Related CA Science Standards and Vocabulary

Specific standards and new vocabulary related to lesson

CA Science Standard(s):

electricity, magnetism, forms of energy

Vocabulary/Definitions:

electricity, current, magnet, field, electromagnetic motor, electromagnetic generator

Introduce and Engage

Making personal connections, engaging curiosity, building connections to kids' experiences

Personal Introduction: *What do you do for work, hobbies, play? Why are you interested in this topic?*

1. Kalil Oldham, Seattle, lived in New England 6 years, 4 years in California; soccer, climbing, outdoors, movies.
2. Educational background – background in science and history of science.
3. What's interesting about electricity is that we see it all around us and take it for granted; we're going to learn some of the basic principles that make it work.

Building Connections to Kids' Experiences: *Can you think of an experience most kids would have related to your topic? Is there something to show that will grab their attention? Or can you pose a mystery with a question about something they see everyday?*

1. Connections to electrostatics – sticking a balloon to your hair; electric shocks; lightning.
2. Magnets and magnetic fields – refrigerator magnets; compasses for navigation.
3. Electromagnetism – electromagnets (salvage yard); motors; generators; power plants; transformer stations.

Learning Experiences

Any combination of demonstrations, hands-on activities, and pictures that helps kids explore new ideas.

Describe specific experiences in the order you plan, including instructions you need to give students.

What kids will see, do, hear, touch, taste or make.

Day 1:

1. Activities and demonstrations with electrostatics: pith balls, aluminum foil, pvc piping, wool, balloons.
2. Activities and demonstrations with magnetism: compasses, bar magnets, iron filings, understanding and drawing the magnetic field.
3. Discussion of the historical background of electric and magnetic phenomena; they've been observed since ancient times but it wasn't really until the 19th century that the modern understanding of these observations began to be formed.



Day 2: Building the electromagnetic motor. Begin with re-cap of what we did in the first lesson; then ask how we can put all of these interesting phenomena to work for us. Building on the previous historical discussion we will also talk about how in the 19th century we first learned how to put the strange phenomena of electricity and magnetism to practical use. Detailed instructions follow for building the motor will be provided.

Sharing Experiences & Building Ideas

What kids will share about experiences and how to help them interpret experiences to build ideas and vocabulary.

Invitation to Share and/or Discussion Questions:

What would we do if we hadn't harnessed the power of electricity? What are some of the most important ways in which we depend on electricity (e.g. communication, transportation, lighting, entertainment, etc.)?

Summary and Closing Ideas:

We've seen how novel and interesting phenomena, as they became better understood, were able to be put to practical use and eventually to form part of the technological foundation of modern society.

Follow-On Activities

Ideas for follow-on activities, your favorite kid books, things to notice

Follow-ups on this lesson could include: the students could be asked to think about and make a list of every day household items that are powered by electromagnetic motors; it may also be interesting to hold a discussion of the diverse sources of electricity in modern society and the social and political issues that energy policy raises (in the United States and other parts of the world).

Materials and Preparation in Classroom

required materials and classroom set-up for complete lesson.

Volunteer Brings: Pith balls with stands, pvc, wool, aluminum foil bits, compasses, magnets, iron filings, power sources, copper wire, alligator clips, foam cups, paper clips, masking tape, sandpaper, sharpie, magnetic fields worksheet.

Classroom Needs: Pencils, paper, overhead projector.

Set-Up Requirements: Divide students into groups of approximately 5; I've got enough set-ups for 6 groups.

