

**Project FOCUS  
Best Lessons  
SECOND GRADE**

**Title of Lesson:** Making Electromagnets

**Theme:** Physical Science

**Unit Number:** 3      **Unit Title:** energy/ Pushes and Pulls

**Performance Standard(s) Covered (enter codes):**

S2P3

S2CS3

**Enduring Standards (objectives of activity):**

**Habits of Mind**

- Asks questions
- Uses numbers to quantify
- Works in a group
- Uses tools to measure and view
- Looks at how parts of things are needed
- Describes and compares using physical attributes
- Observes using senses
- Draws and describes observations

**Content (key terms and topics covered):**

Energy and Magnetism

**Learning Activity (Description in Steps)**

**Abstract (limit 100 characters):** Students will make an electromagnet using a nail, wire, and battery.

**Details: Objective/Purpose:**

The purpose of this experiment was to teach the students to understand the type of energy that is found in a battery and to show the students that science and the energy aspect of it can allow one to change a regular, previously unmagnetized, iron nail into a strong magnet. This will not only teach about magnets and energy but will also encourage the students to think big and do experiments.

**Background Information:**

I came up with this project to incorporate the idea of stored energy with the thrill and “magic” of turning a nail into a magnet using that stored energy. I thought it would be a good idea to show that energy from a battery could be used to make a magnet. It is especially good for students in elementary school because immediately upon applying the energy the nail becomes magnetized. The students can see that it is actually the energy from the magnet that causes the nail to be magnetized. This allows the students to know that there is actually something in the battery and tangibly see it.

**Preparation:**

Before conducting the experiment in class I made an electromagnet by winding the wire around the nail and leaving ends on both sides long enough to connect to the battery. This gives the students an example of the ultimate goal they are trying to accomplish. Also have an extra nail and piece of wire so that you after you give each student their materials you can make another magnet while they are watching so that they can see how it is done. Have the students make a prediction as to what will happen to the nail once the stored energy from the battery is applied. Also make sure that the students understand what kind of energy it is in the battery.

**Activity Outline/Teacher Procedure:**

Show students how to make the electromagnet and then walk around the room and help because depending on wire thickness it can be hard to wrap the wire around the nail. Be sure to have the students leave enough wire on both ends to connect the wire to the battery because without two open ends the magnet will not work. As the students make their magnets be sure that they know that in the battery there is stored energy. Also incorporate in the lesson that certain metals are magnetic.

**Possible Questions:**

What types of things does a magnet attract?

Why does the thing in the middle (the nail) have to be metal?

What type of energy is in the battery?

Why must you strip the plastic coating from the ends of the wire?

**Assessment/Evaluation:**

Can the class use their motor skills to create an electromagnet and understand that by applying energy it is possible to turn a nonmagnetic nail into a powerful magnet?

**Materials Needed (Type and Quantity):**

**Materials:**

- 20D iron nails
- 1-2 foot long copper wire with both ends stripped
- paper clips
- size C batteries or bigger

**Notes and Tips (suggested changes, alternative methods, cautions):**

**Safety Issues:**

- It is important to stress to the class to not leave the ends of their wires connected to the battery because it can get hot.
- The ends of the wires can potentially be sharp and students should be careful not to poke themselves or their neighbors.

**Sources/References:**

- 1)
- 2)
- 3)