



Using Electricity To Make A Magnet



Project Overview:

Middle and high school science teachers will earn 10 recertification points upon the completion of this activity. All of the materials needed to complete the activity are included in the box. This activity focuses on using electricity to create a magnet. There are three components to this activity:

- There is a reading component for the teacher to complete, along with a set of questions that covers the reading.
- There is a lab component for this activity. The lab will take one class period.
- There are follow-up reports that must be completed by the teacher and students.

Instructions:

1. Contact your school district's staff development office for pre-approval before beginning the project.
2. Read Chapter 1 of *Driving Force: The Natural Magic of Magnets*.
3. Complete the lab yourself by following the lab instructions.
4. Have your students complete the lab according to the lab instructions.
5. Have your students complete the Student Assessment Forms after their lab reports have been handed in. These forms must be submitted. They will be used to evaluate the project, but will not be a contributing factor in earning recertification points.
6. Complete the Teacher Reading Assessment, and the Teacher Project Assessment Form.
7. Contact your school district's staff development office for instructions on where to send the forms. If you have any questions about the project, please email Rich McHenry at mchenryr@mail.leon.leon.k12.fl.us, or Dave Rodriguez at rodriguezd@mail.raa.leon.k12.fl.us

Materials Needed:

1 D-cell battery
1 battery holder
200 cm insulated wire
Compass
Iron rod
Wooden dowel
Aluminum rod

Small paper clips (#1 size)

Lab Instructions:

1. Before you begin to build your electromagnet, check to see if the iron rod is a magnet. If it is, tap it several times on a hard surface. This will demagnetize the rod.
2. Connect the insulated wire to the battery. Be sure the ends of the wire are bare. Insert the battery into the battery holder. Place the compass underneath the wire. Is there any reaction?
3. Detach the wire from the battery. Now wrap the wire around the iron rod 15 times before re-connecting the wire to the battery. Place the compass under the wrapped rod. Is there any reaction? Try to pick up paper clips with the magnet. Record your observations.
4. Remove the iron rod from the wire without unwinding it. Will the wire pick up any paper clips? Will the rod alone pick up any paper clips? How can you explain your observations? ***Be sure to disconnect the wire from the battery between trials to save on battery life.***
5. Use the wooden dowel and then the aluminum rod as a core around which you will again wrap the insulated wire 15 times. Place a compass under the wrapped rods. Do you get the same reaction that you got in step 3? Does either of these pick up paper clips?
6. Write an explanation of what you have learned from this activity. This can be a summary of what happened and why.

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Sunshine State Standards

Middle School:

- The student understands that all matter has observable, measurable properties. (SC.A.1.3)
- The student understands the basic principles of atomic theory. (SC.A.2.3)
- The student recognizes that energy may be changed in form with varying efficiency. (SC.B.1.3)
- The student understands that the types of force that act on an object and the effect of that force can be described, measured, and predicted. (SC.C.2.3)
- The student uses the scientific processes and habits of mind to solve problems. (SC.H.1.3)
- The student understands that most natural events occur in comprehensible, consistent patterns. (SC.H.2.3)
- The student understands that science, technology, and society are interwoven and interdependent. (SC.H.3.3)

High School:

- The student understands that all matter has observable, measurable properties. (SC.A.1.4)
- The student understands the basic principles of atomic theory. (SC.A.2.4)
- The student recognizes that energy may be changed in form with varying efficiency. (SC.B.1.4)
- The student understands that the types of force that act on an object and the effect of that force can be described, measured, and predicted. (SC.C.2.4)
- The student uses the scientific processes and habits of mind to solve problems. (SC.H.1.4)
- The student understands that science, technology, and society are interwoven and interdependent. (SC.H.3.4)

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National Education Science Standards

Middle School:

Content Standard A: Science as Inquiry

- As a result of activities in grades 5-8, all students should develop abilities necessary to do scientific inquiry.
- Understandings about scientific inquiry

Content Standard B: Physical Science

- As a result of activities in grades 5-8, all students should develop an understanding of transfer of energy.

Content Standard E: Science and Technology

- As a result of activities in grades 5-8, all students should develop abilities of technological design.
- Understanding about science and technology

Content Standard F: Science in Personal and Social Perspectives

- As a result of activities in grades 5-8, all students should develop understanding of personal health.
- Science and technology in society

Content Standard G: History and Nature of Science

- As a result of activities in grades 5-8, all students should develop understanding of science as a human endeavor.
- Nature of science
- History of science

High School:

Content Standard A: Science as Inquiry

- As a result of activities in grades 9-12, all students should develop abilities to do scientific inquiry.
- Understandings about scientific inquiry

Content Standard B: Physical Science

- As a result of activities in grades 9-12, all students should develop an understanding of motions and forces.
- Conservation of energy and increase in disorder
- Interactions of energy and matter

Content Standard E: Science and Technology

- As a result of activities in grades 9-12, all students should develop abilities of technological design.
- Understanding about science and technology

Content Standard F: Science in Personal and Social Perspectives

- As a result of activities in grades 9-12, all students should develop understanding of personal and community health.
- Science and technology in local, national, and global challenges

Content Standard G: History and Nature of Science

- As a result of activities in grades 9-12, all students should develop understanding of science as a human endeavor.
- Nature of scientific knowledge
- Historical perspectives