

# *Magnetism – Causes and Composition*

## Lesson Plan

**Grade Level:** 6-8

**Curriculum Focus:** Forces and Gravity

**Lesson Duration:** Two class periods

### *Student Objectives*

- Only certain materials can be attracted by a magnet.
- Those materials contain iron.
- Magnetism is caused by the behavior of atoms in a magnet.

### *Materials*

- Discovery School video on *unitedstreaming: Understanding Magnetism*  
Search for this video by using the video title (or a portion of it) as the keyword.

Selected clips that support this lesson plan:

- The Earth as a Giant Magnet
- Magnets Mimic the Motion of Creation
  
- Research materials on magnetism
- Computer with Internet access

For each group:

- A variety of objects including some that will and some that will not be attracted by a magnet (suggestions: aluminum foil, silver or gold jewelry, high-iron cereal crushed into a powder, crushed multivitamin tablet or emptied multivitamin capsule that contains iron, piece of videotape, piece of audiotape, inside of a computer disk)
- Strong magnet

### *Procedures*

1. Review with your students what they have learned about magnetism. Encourage them to discuss their experience with magnets, including experiments they have performed. Then let them know that they are about to perform a series of simple experiments that will show which of a group of objects will be attracted to a magnet.
2. Divide the class into groups, providing each group with the materials listed above.
3. Before they experiment, have the groups meet to predict which materials will be attracted by the magnet and which will not. They should devise charts on which to record their predictions.

4. Have group members take turns testing each object or substance with the magnet. On their charts, they should record what was attracted by the magnet and what was not. Were their predictions confirmed?
5. Ask students if they can explain the results of their experiments. Then, divide the class into research groups, allowing students to use the materials you have provided, materials in the school library, or sources on the Internet to find out what causes magnetic attraction.
6. Each student should write a brief explanation of magnetism based on his or her research. The explanation should include a description of the behavior of atoms in a magnet, as well as reasons that the specific materials with which students experimented were or were not attracted by a magnet.
7. Have students share their explanations with their groups.

### **Discussion Questions**

1. Discuss the idea of a magnetic reversal. Should we be monitoring the possibility of one more closely, or is it safe to assume that since the Earth has gone through reversals before that we will successfully survive another one?
2. Discuss the idea of integrating different disciplinary areas of science toward a common goal. Does this seem like a reasonable idea? Why might scientists not want to collaborate with colleagues from other disciplines or even with colleagues from their same area of discipline?
3. Discuss why studying bacteria and animals who use magnetic field lines for navigation is useful. Can you point out advantages to being able to navigate using magnetic field lines?
4. Discuss in depth the impact Michael Faraday has had on our society with his inventions of the electric motor and the electric generator. Why don't more people know who he is if his contributions have been so revolutionary?
5. Discuss whether more money should be designated for building a bigger particle accelerator. If you think the money should be spent, what or who should be the source of the money?
6. Discuss the idea of limitless, extremely cheap and clean power. Do you believe a source of power can truly be limitless? Why might some people not want to spend money for research on fusion? Who would not benefit from widespread use of fusion?

### **Assessment**

Use the following three-point rubric to evaluate students' work during this lesson.

- 3 points: Student's explanation included accurate information; clear wording; logical organization; each material in experiments accounted for.
- 2 points: Student's explanation included adequate information; wording sometimes unclear; satisfactory organization; not all materials in experiments accounted for
- 1 point: Student's explanation included some inaccurate information; some unclear wording; organization unsatisfactory; not all materials in experiments accounted for.

## Vocabulary

### **charlatan**

*Definition:* A person who makes elaborate and fraudulent claims to skill or knowledge.

*Context:* Though declared a charlatan and a quack by a Royal Commission, Mesmer had discovered something, the magnetic link between magic and medicine.

### **converge**

*Definition:* To approach an intersecting point.

*Context:* Like all magnets, the Earth's field lines converge at its magnetic poles.

### **lexicon**

*Definition:* A stock of terms used in a particular profession; a dictionary.

*Context:* Magnetic Resonance Imaging technology revolutionized health care and the acronym MRI entered the popular lexicon.

### **ore**

*Definition:* A mineral or aggregate of minerals from which a valuable constituent, such as metal, can be profitably mined.

*Context:* Lodestone is an iron ore, a natural magnet.

### **plasma**

*Definition:* An electrically neutral, highly ionized gas composed of ions, electrons, and neutral particles.

*Context:* When those charged particles hit the atmosphere they ionize it and make a weak plasma.

## Academic Standards

### **National Academy of Sciences**

The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K-12. To view the standards, visit <http://books.nap.edu>.

This lesson plan addresses the following science standards:

- Physical Science: Transfer of energy; motions and forces

### **Mid-continent Research for Education and Learning (McREL)**



McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit <http://www.mcrel.org/>.

This lesson plan addresses the following national standards:

- Science—Physical Science: Understands forces and motion.
  - Science—Nature of Science: Understands the nature of scientific inquiry.
  - Technology: Understands the relationships among science, technology, society, and the individual
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## **Support Materials**

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the [Discoveryschool.com](http://www.discoveryschool.com) Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>

