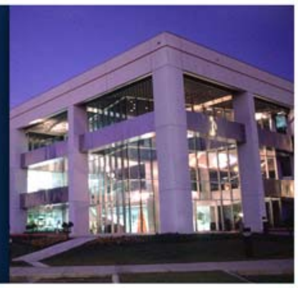
Classroom Visit Pre/Post Materials



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The National High Magnetic Field Laboratory

What is the NHMFL?

- The National High Magnetic Field Laboratory is a working science research laboratory utilizing state-of-the-art high magnetic field research systems. It is a world leader in magnet-related research and technology.

- The laboratory is one of nine in the world and the only one in North and South America. It was established in 1990 by the National Science Foundation and the State of Florida and is operated by the Florida State University, the University of Florida, and Los Alamos National Laboratory.
- The NHMFL brings together distinguished scientists and technicians from many disciplines including physics, chemistry, biology, geology, engineering, and materials science.
- Research at the NHMFL has implications and applications in medicine, energy, communications, electronics, the environment, transportation, and materials research and development.
- The laboratory is committed to enhancing science education with extensive educational programming at all levels.

How will your students benefit from the visit and the suggested activities?

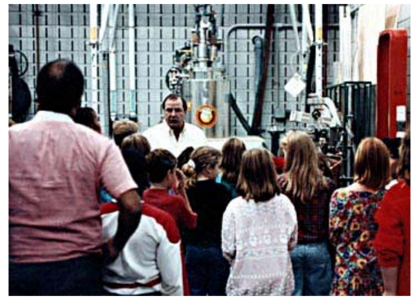
- Students will hear firsthand about what is done at a science research laboratory.
- Students will learn about diverse career opportunities in science and scientific research.

Pre-Visit Activities

The suggested pre-visit activities introduce students to basic ideas about the topic and the processes of science. Activities are correlated to the Sunshine State Standards and also include reading and writing extensions.

Post-Visit Activities

The suggested post-visit activities are designed to reinforce and expand upon what was learned by your students during the visit. The activities encourage students to analyze their ideas and spark further interest in science.



The NHMFL Education Website

You and your students are encouraged to visit the NHMFL education Website before and after your visit:

http://education.magnet.fsu.edu

Pre-Outreach Activity:
What Do We Already Know?

Teacher Background:

A simple, yet effective learning strategy, a K-W-L chart, is used to help students clarify their ideas. The chart itself is divided into three columns:

K What we **K**now	W What we **W**ant to know	L What we **L**earned

Materials:

- Chart Paper
- Markers

Activity Instructions:

1. Facilitate the creation of the chart by brainstorming with the class and listing everything that the class knows about magnets and magnetism. Be sure to list any misconceptions that the students may have. There are no right or wrong answers.

2. Next list everything that the class wants to know about magnets and magnetism. You may need to provide prompts such as:

Have you used or seen a magnet today?

If you were a scientist, what would you like to discover about magnets?

3. Keep the chart accessible so that you and the students can enter ideas, new information, and new questions, at any time. The class can return to the K-W-L chart after completing the activities. As students learn the answers to their questions, list the answers in the L column of the chart

4. K-W-L charts are useful in identifying misconceptions that students have about magnets and magnetism. Once the misconceptions are identified, have students design a way to test their ideas, reflect on what they observe, and refine the original conclusion.

5. Periodically, return to the K-W-L chart during the activities to check off items from the W column and to add to the L column. Students may want to add items to the W column to further their explorations.

Standards:

Grades 3-5: SC.C.2.2.1, SC.H.2.2.1
Grades 6-8: LA.C.1.3.1, SC.H.1.3.5, SC.H.2.3.1

NAME____________________________

TOPIC____________________________

TEACHER____________________________

WHAT DO YOU **K**NOW	WHAT DO YOU **W**ANT TO KNOW	WHAT HAVE YOU **L**EARNED?

K W L

Outreach Follow-up Activity: Does a Magnet Work in Water?

Teacher Background:

This experiment addresses a question that students often ask. How do various substances affect a magnet? This experiment can be repeated, each time changing the variable (the substance), allowing the children to explore not only magnets, but the scientific process.

Materials:

- Round donut magnet
- 500 mL beaker (a mason jar will also work)
- Metal paper clips
- Six-sided pencil
- 8 inch piece of string
- Water
- Scissors
- Tape

Activity Instructions:

1. Tape a piece of string to the middle of the pencil so it winds as the pencils turns. Tie the other end of the string to the magnet. Turn the pencil so that the magnet is wound all the way to the top.

2. Place the paper clip inside of the beaker and hold the pencil on top of the beaker so that the magnet is hanging inside the beaker.

3. Slowly turn the pencil so that the magnet is lowered into the center of the beaker. Keep unwinding until the paperclip is attracted to the magnet. Have students record their observations.

4. Repeat steps 2 & 3 with the beaker half full of water.

5. Have students record their observations after the addition of the water. Pay particular attention to any changes.

6. This experiment can be repeated several times, each time using a different liquid and observing changes. Try using salt water, clear soda, juice, etc.

7. Have students compare results among groups and devise a way to quantify them. One way is to mark the string in equal units, and observe the magnet in different liquids.

Standards:

Grades K-2: SC.A.1.1.1, SC.A.1.1.2, SC.A.1.1.3, SC.C.1.1.2
Grades 3-5:SC.A.1.2.2, SC.B.1.2.2, SC.B.1.2.5, SC.C.2.2.1, SC.C.2.2.4

Outreach Follow-up Activity: Iron In Our Food

Teacher Background:

The human body needs iron for many reasons. The iron in hemoglobin attracts oxygen molecules, allowing the blood cells to carry oxygen to the rest of the body. Red blood cells have a very short life span, and new cells are always being created. Therefore, there is a constant need for a new supply of iron. Many people buy certain foods in an effort to increase the iron in their diets. Cereal is one of those foods.

In this activity, students will literally pull the iron from cereal. Try this with different food products that claim to be “iron rich.”

Materials:

- Wand magnets
- Total brand Cereal
- Small bowls
- Clear plastic disposable cups
- Water
- Ziploc sandwich bags

Standards:

Grades K-2: SC.A.1.1.1, SC.A.1.1.2, SC.A.1.1.3, SC.C.1.1.2
Grades 3-5:SC.A.1.2.2, SC.B.1.2.2, SC.B.1.2.5, SC.C.2.2.1, SC.C.2.2.4

Activity Instructions:

Students can do this activity individually or in small groups. This activity is written for group work.

1. Have students predict what will happen if they put a magnet in a bowl of cereal. Place 1 cup of cereal in the bowl. Students then crush the flakes with their hands.

2. Transfer the crushed flakes to a ziploc bag. Add water and mix. The mixture should be thin and soupy.

3. Let the mixture sit for at least 1 hour; overnight is fine.

4. After the cereal mixture has been allowed to sit, pour some of it into the plastic cup.

5. Drag the wand magnet against the side of the cup for about a minute. Then tip the cup so that the cereal mixture runs to one side of the cup, away from the magnet. Students will observe iron particles on the side of the cup. Have students record their observations.

FCAT Sample Practice Questions

1. Jamesha has a bar magnet in her hand. The north end is painted red. The south end is painted blue.

What will happen when she brings the north end of her manget to the south end of Brittney's magnet?

A They will attract
B Nothing will happen
C They will repel
D Sparks will fly

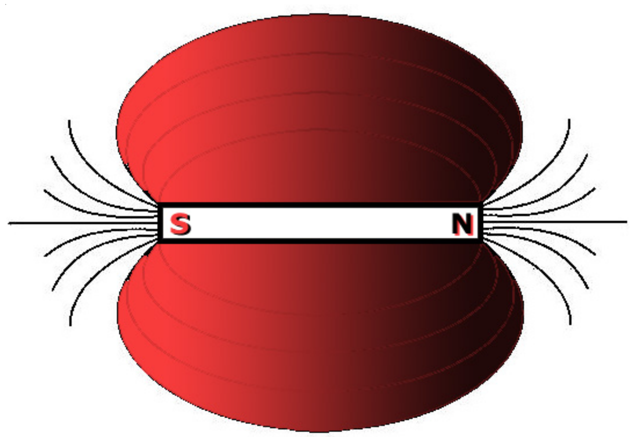
2. Jamesha accidently drops her magnet into a fish tank and does not find it for a week.

When Jamesha finds her magnet, how will the magnetic field be different?

F It will be stronger
G It will be weaker
H It will be the same
I It will be gone

FCAT Sample
Practice Questions

3. Tunji is looking at the drawing he made of the magnetic field around his bar magnet.



Tunji's Magnetic Field Drawing

What is the strongest part of the magnetic field?

A The north pole
B The south pole
C The middle of the magnet
D Both poles

4. Tunji is taking his magnet around the classroom to see what items are magnetic.

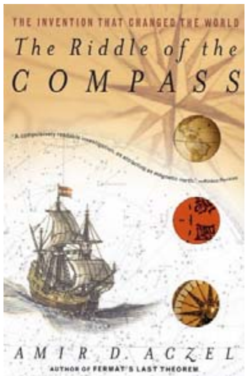
Which of the following items will be attracted to Tunji's magnet?

F A crayon
G Chalk
H A block of wood
I A paper clip

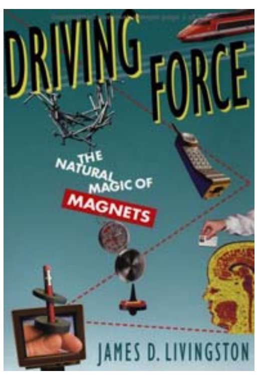
Vocabulary List:

Attract	To cause to draw near by a force.
Electromagnet	A temporary magnet that is run with electricty.
Magnet	An object that is surrounded by a magnetic field and that has the property, either natural or induced, of attracting certain metals. All magnets have a North and South pole.
Magnetic field	A region around a magnet in which objects are affected by the magnetic force.
Magnetic Pole	The north or south pole of a magnet, where the magnetic field is the strongest.
Permanent Magnets	A piece of magnetic material that retains its magnetism after it is removed from a magnetic field.
Repel	To push back or away by a force.
Temporary Magnets	A piece of magnetic material that demonstrates the properties of a permanent magnet only while in a magnetic field.

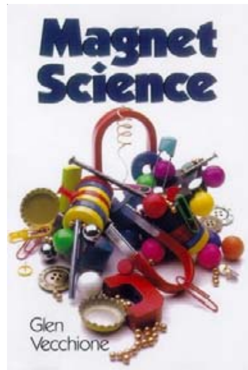
References



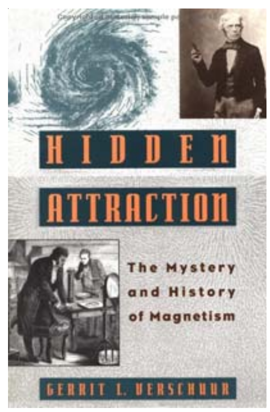
Aczel, Amir D. (2001). The Riddle of The Compass. Harcourt. This is the ultimate chronological tale of the compass, from its origins in China, to its roots in Italy, where claims are made that it was first created. The book also portrays the impact that this invention had on navigation, and how in the hands of Europe, the compass opened up the world for exploration and turned European kingdoms into economic empires.



Livingston, J.D. (1996). Driving Force: The Natural Magic of Magnets. Cambridge: Harvard University Press. A comprehensive reference on magnets, magnetism, and related ideas, this book can be used to understand the basics or go beyond to an explanation of quantum electrodynamics. This resource links magnetism with all science disciplines as well as current issues related to magnetism such as health concerns and high voltage wires. Practical applications of magnetism are explained, as are the historical experiments upon which current magnet science is based.



Vecchione, Glen. (1995). Magnet Science. Scholastic Inc. The perfect companion for magnet beginners, this book keeps things on a simple level while exploring the many uses of magnetism, and the fun that can be had with it. Activities contained within range from creating a magnet fishing game to building an electric motor. The perfect reference for the young inquiring mind.



Verschuur, G.L. (1993). Hidden Attraction: The Mystery and History of Magnetism. Oxford University Press. An invaluable teacher resource on the history of magnetism, this volume also includes practical applications of magnets and magnetism as well as information on magnet science in general. It is a comprehensive reference guide for any teacher or student of magnetism.

Notes

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