

- www.exploratorium.edu/snacks/iconmagnetism.html
The Exploratorium Science Snacks site lists a number of hands-on magnet experiments.

Suggested Print Resources

- Angliss, Sarah. *Electricity and Magnets*. Kingfisher, New York, NY; 2001.
- Branley, Franklyn. *What Makes a Magnet?* Harper Trophy, New York, NY; 1999.
- Macaulay, David. *The New Way Things Work*. Houghton Mifflin Company, New York, NY; 1998.
- Tocci, Salvatore. *Experiments With Magnets (True Books)*. Children's Press; 2001.
- Wood, Robert. *Electricity and Magnetism Fundamentals*. McGraw Hill, New York, NY; 1997.



Magnets

Grades 3-6

Journey to Mammoth Island, a whimsical place where investigating scientific principles is always an adventure. Olive, a young girl, assisted by the Island's mammoth population and a visiting inventor helps the locals discover why and how machines work. Science facts are clearly demonstrated, giving kids an opportunity to see how important everyday machines are linked together by the science that drives them. Students come to see that science is a way of organizing information about the world, explaining why things work the way they do and allowing us to predict what might happen in new situations.

This guide provides a brief synopsis of the program, background on the science concepts presented, discussion topics, additional activities, vocabulary and suggested print and Internet resources.

TEACHER'S GUIDE

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Program Summary

In *Magnets*, inhabitants of Mammoth Island discover the power of an invisible force called magnetism. A magnet is a piece of metal surrounded by an invisible force called a magnetic field. When a magnet comes near certain material, like iron, the iron is attracted to the magnet and sticks to it with a powerful force. Magnets come in all different shapes and sizes, but no matter what they look like, all magnets have something in common. They all have a north pole and a south pole. When two horseshoe magnets come near each other, they can have one of two effects on one another. Opposites attract, so north poles attract south poles, and south poles attract north poles, creating a powerful magnetic bond that hold the magnets together. Since poles of the same sort repel each other, horseshoe magnets can also send each other flying if their like poles are placed next to one another.

The Islanders discover the power of electromagnets when a sudden lightning bolt transforms their “clothes dryer” — a contraption made of wire wound into a coil around an iron bar. When an electric current flows through the wire, the current creates a magnetic field around it. The iron bar in the middle helps to concentrate the field, and because of the high number of turns in the coil, a very strong magnetic field is created. When the current flows, the bar develops opposite poles at either end, which attract iron and steel objects.

Different types of electric motors make use of electromagnets that spin shafts called axles. By hooking up gears and belts to the spinning axles, motors can do some very hard work. A maglev train also uses powerful electromagnets. The magnetic field from the track is so strong that it repels or lifts the train just a few inches off the track to actually raise itself above the track. Freed from friction with the rails, the train can float along very smoothly and quietly. It is propelled forward by magnetism as well. Coils on the train generate a magnetic field in which the poles shift along the train.

Glossary

The following words are included for teacher reference and for use with students to extend the subject matter in the show.

atoms — The smallest particles of which all living things are made.

attract — To pull together. When opposite magnetic poles are put together, they attract one another.

current — Electrical charges that flow through a conductor.

electricity — Invisible energy that is made up of charged parts of atoms.

electromagnet — A material with a strong temporary magnetic field created by electricity and magnetic substances.

force — A push or a pull on an object, causing a change in motion.

magnet — Something that can attract iron and certain other materials and has an invisible magnetic field surrounding it.

magnetic field — An area around a magnet in which an invisible magnetic force exists.

magnetism — A natural force of attraction or repulsion of magnetic materials, caused by the lining up of their atoms.

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pole — The north or south end of a magnet. The poles are the strongest areas of a magnet.

repel — To push away. When two similar magnetic poles are put together, they repel one another.

Pre-viewing Discussion

- What is magnetism? Discuss how we know magnetic fields exist, even though they're invisible.
- How do magnets work?
- What are magnets attracted to? What types of items aren't they attracted to?
- What are magnets used for? What are some common household items that utilize magnets?

Follow-up Questions & Activities

- Magnets should not be placed near many objects (television screens, computer monitors, library cards, credit cards, video and audio tapes). Have students research and explain why this is and what might happen to objects damaged by magnets.
- Have students investigate magnetic fields using magnets of different shapes, strengths and sizes. Using odd-shaped magnets, and iron filings over paper, locate the poles. Combine two, then three, and even possibly four magnets, drawing the magnetic fields revealed by the iron filings. By using different shaped magnets, students can see different patterns.
- Have students research the uses of magnets in household appliances and complete a creative writing assignment describing a day without magnetism.
- Make electromagnets using long nails, coils of wire and a battery. Have students discover the relationship between the number of wire wrappings and the ability to pick up a number of paper clips. Challenge the class to make the strongest electromagnet they can.
- Provide magnets and common objects made of materials such as glass, water, wax, paper, plastic, wood and metal. Have students investigate to determine what kinds of materials are attracted to magnets.
- Give each student a toy car, tape and a number of small magnets. Ask them to devise a way to make the cars move without touching them.

Suggested Internet Resources

Periodically, Internet Resources are updated on our Web site at www.LibraryVideo.com

• www.science-tech.nmstc.ca/english/schoolzone/Info_Magnets.cfm
The National Museum of Science and Technology presents this informative site that answers basic questions concerning magnets.

• www.windows.umich.edu/physical_science/magnetism/force_of_magnetism.html
“Windows to the Universe” is an easy-to-comprehend site with a friendly beginner's interface to provide all the details students need to know about the force of magnetism.

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