

MYTHS AND MAGNETISM



PLANNING THE EXPLORATION

All science disciplines have their share of myths and misconceptions. Magnetism is no exception; in fact, because the study of magnets and magnetic fields requires understanding a force that we cannot see as well as other scientific concepts to explain that force, it is particularly prone to misunderstandings. Similar to studying works of science fiction, exploring various myths and the cultures that created those myths requires that students distinguish fact from fiction. To really understand myths about the natural world, students must have a deep knowledge of the subject in question.

This Exploration requires that students analyze both expository pieces and fiction, distinguishing between explanation and evidence. Although myths, stories, and seemingly scholarly articles may appear to state an explanation that makes sense to the reader, students must be looking for evidence to support the explanations. How far you choose to go with this Exploration depends on the time available to you as well as the level of sophistication of your classes. If your students are studying World Cultures, for example, there is a possible connection investigating myths of certain cultures and identifying how myths are a representation of beliefs and rituals.

Listed below are several areas that students could explore. Any other ideas that students develop themselves should be encouraged. If students identify a misconception that they held before working through this series of Expeditions, that could be a good place to start. Several assessment activities appeared previously as Excursions; other Excursions could be used as well.

BACKGROUND INFORMATION

It is advisable here to differentiate between myths and misconceptions if only to clarify them for students so that they are successful in completing their tasks. According to The New Merriam-Webster Dictionary, a myth is a “legendary narrative that presents part of the beliefs of a people or explains a practice or natural phenomenon.” A misconception, on the other hand, although similar, is not necessarily an attempt to explain natural phenomena but is a misunderstanding or misinterpretation based upon prior understanding. It is only when students present their work that misconceptions can be identified. As students display their work, not only do they get to clarify it for themselves but for the teacher as well. An outstanding example of a student’s misconception and the teacher’s attempt to correct it is found in the short video, “A Private Universe,” available from The Astronomical Society of the Pacific, 390 Ashton Avenue, San Francisco, CA 94112.

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Health issues. Living in or near an area where high magnetic fields are generated is a concern to some people who believe that there is a connection between these fields and incidences of cancer. It remains to be seen as to whether or not this is a misconception; **however, recent medical research indicates no correlation between health problems and high voltage wires.** Any time electric current runs through a wire a magnetic field is generated. The implication is that all household appliances, lights, and home wiring could affect our health.

There are many health-oriented businesses that make unsubstantiated claims about using magnets to improve pre-existing conditions and prevent others. Because our bodies produce a low intensity biomagnetic field, some researchers believe that we could be affected by exposure to stronger electromagnetic fields. Taking advantage of people who do not fully understand the concept of magnetic fields, there are products on the market today that claim to use magnets to solve myriad health problems. Driving Force (cited below) is a good source for claims of those who believe magnets can be used to cure disease. Some examples that you may wish to share with the students are listed below.

Magnetic field therapy explores the relationship between the magnetic energy in the human body and magnetic fields in homes, offices, etc. Magnetic field therapy claims to be able to use magnets to kill cancer cells, treat arthritis, glaucoma, infertility, and diseases that are associated with aging. Proponents of magnetic field therapy claim that magnets can have a calming effect and help make a patient sleepy; they can reduce stress, and magnetic fields can act as an antibiotic. You may wish to point out here that there is some danger in believing too strongly that magnets can act against viral and bacterial infections.

Biomagnetism is touted as treatment for a wide variety of ills. Using magnets, companies that produce health-related magnets for sale claim that cancer cells cannot exist in magnetic fields, magnets relieve pain and inflammation, and in general, bring a sick body back to health.

One company claims that magnetic foot strips can reduce and, in some cases, eliminate pain throughout all areas of the body. Biomagnetics uses a technique similar to acupuncture since the belief is that different areas of the foot are directly related to all organs of the body, the company claims. For instance, the tip of the big toe connects directly with the sinuses. By using magnetic foot strips a person could, in theory, cure any and all aches, pains, and illnesses. In addition, by wearing a magnetic bracelet, which generates its own magnetic field and electric current, circulation will be improved and fatigue eliminated.

Franz Anton Mesmer. An Austrian doctor and contemporary of Mozart, Mesmer used permanent magnets developed by Father Maximilian Hell, who believed that diseases could be “pulled” from the body by shaping magnets to match the body part in question. Mesmer supported his ideas by reporting cures of seizures, deafness, and chest pains. He called his philosophy “animal magnetism” and as he influenced more and more people in Europe, they were known to be “mesmerized.” Mesmer’s assistants, known as magnetizers, later branched off into the study of hypnotism which explains why some people use the words hypnotism and mesmerism as synonyms. This is fertile ground for research on early medicine since the modern practice of chiropractic developed from an interest in magnetic healing. Driving Force by James D. Livingston (ISBN 0-674-21645-8) is an excellent source for early medical uses for magnets.

Native American myths. Indigenous people from all over the world traditionally utilize storytelling to communicate and pass on information. Often these stories are myths that have

Exploration C: *Myths and Magnetism*

developed over the years by individual tribes as they attempt to explain and understand the natural world. As important as it is to identify and clarify students' thinking before teaching a new concept, it is also important to do the same for other cultures. Investigating cultures other than their own helps students look at their own world in a different way and realize that there are many perspectives through which to view the natural world. Native Americans do not see themselves as apart from nature but, rather, as a part of the natural world. Rather than observing and attempting to control nature, they view themselves as an integral part of it which provides a different way of looking at relationships among people. ___

FOR YOUR PLANBOOK

Suggested time: 1+ hours

Gear: CD-ROM for reference, books, articles, project supplies

National Science Content Standards: A, B, C, E, F, G

Sunshine State Standards Benchmarks:

SC.B.2.3.2, SC.C.2.3.1-2, SC.D.2.3.2, SC.G.2.3.1, SC.H.1.3.1-2,6, SC.H.3.3.1-2,6, SC.H.3.3.4-6

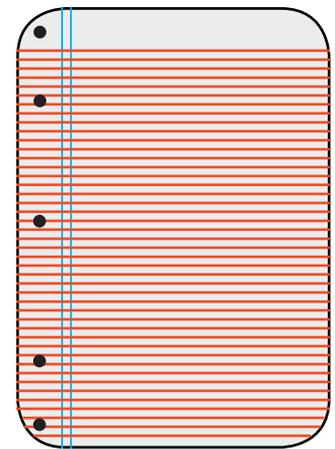
Sunshine State Standards Benchmarks -- Language Arts:

LA.A.1.3.1-4, 2.3.1-4, LA.B.1.3.1-3,2.3.1-4, LA.C.1.3.1-3, LA.D.1.3.1-4, 2.3.1-7, LA.E.2.3.1

Sunshine State Standards Benchmarks -- Social Studies:

SS.B.2.3.6-9, SS.C.2.3.6-7, SS.D.1.3.1-3

Assessment:



Conduct a **class discussion or debate** about health concerns of people living near high-power lines. Some people believe that the magnetic fields created by these high-power electrical lines are harmful. A worldwide web search or print media search could turn up many articles on this subject. Choose four class members for each side and the rest of the class becomes the audience at a town meeting called by concerned citizens. At the end of the debate the audience helps decide whether or not to pay to evacuate citizens that live in the affected area. This exercise takes a real-world concern/current issue and allows students to use their knowledge of magnetic fields learned in the classroom. They will be modeling a process

that is widely used by communities to discuss issues of mutual concern. [The New York Times Book of Science Literacy](#) (ISBN 0-06-097455-9) has a short article on this subject.

A **search of worldwide web sites** about



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magnetism will reveal a large number of products for sale designed to aid certain health conditions using magnets. Have students research these -- let each group choose one -- and then report back to the class as a whole why it would be a waste of money to buy each of the items. Becoming educated, responsible consumers is important especially when the students realize that they control a large percentage of dollars spent on consumer goods.

Encourage students to **write their own myths** about magnetism. For example, myths could deal with auroras (see “Auroras, Moon Rocks, and Magnetism”). Magnetite (lodestone) as a compass could be the subject of a myth about Native Americans migrating. Students must find a way to present their myth to the class. Storytelling, role-playing, drawings, dancing and singing are some options for class presentations that would be true to Native American culture.

Have students **create a chart** of myths and misconceptions about magnetism that they have discovered over the course of completing the Expeditions and Explorations, that they find on the worldwide web, or that are found in newspapers, magazines, stories, television, films, etc. One column of the chart will be to list the myths and/or misconceptions and the second column will list the science fact that disputes or repudiates them.

Have students **create cave drawings** to explain the phenomenon of magnetism. Early inhabitants often recorded natural occurrences that later became part of Earth’s history. Students can recreate this way of communicating using drawing paper or papier mache, cardboard, or other media. Cave drawings were used in much the same way that Native Americans used their stories: to explain the natural world.

Students **organize a poster session** that educates other classes about myths and misconceptions regarding magnetism and magnetic fields. Each group of students creates a poster that combines written explanation with graphics as well as a short oral presentation. The posters could be transported to an elementary school as part of a plan to educate elementary students about magnetism. **Myths** could also be a part of an outreach program to elementary schools in which middle school students read original works to classes and extend this further to explain the writing process.