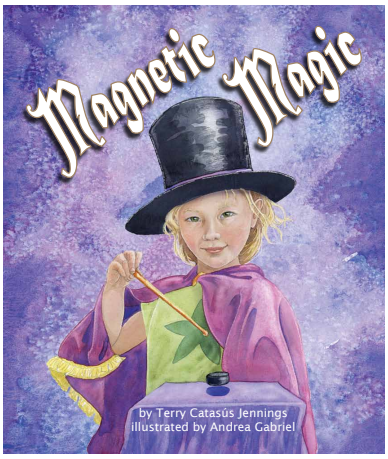
Magnetic Magic

BY TERRY CATASÚS JENNINGS

Discussion and Teacher Guide

ABOUT THE BOOK



Dena loves using magnets to perform magic tricks for the kids at the pool. When Enrique arrives in town, he doesn't like that Dena is fooling the others. He gives her a century-old treasure map and Dena uses her compass and tools to plot the location of the treasure. To her surprise, the treasure is not where it should be! What could cause her compass to lead her off course? When she discovers the answer, will Dena keep fooling the other kids with magic tricks or will she help them learn about magnetism and Earth's shifting magnetic poles?

For core standards to which *Magnetic Magic* is aligned, please visit:

http://www.arbordalepublishing.com/Standards.php

For publisher's teacher guides and activities on magnetism, please visit:

http://arbordalepublishing.com/bookpage.php?id=MagneticMagic

PRE-READING DISCUSSION

Perform the tricks in *Magnetic Magic* as a preamble to your discussion. What better way to introduce magnetism than to see it in action? Ask students to share what they know about magnetism—how magnets work, for what do we use magnets. What kinds of materials are magnetic?

DISCUSSION

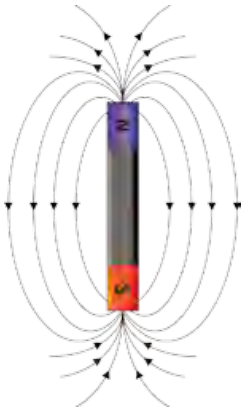
WHAT IS MAGNETISM? Magnetism is a force. The ancient people in the town of Magnesia in Asia Minor—now Turkey—found that some rocks attracted and repelled each other, depending on how they faced. The stones also attracted things made of iron. They called these rocks magnets. We now call these rocks lodestones. They are likely formed when a piece of magnetite (a mineral made mostly of iron) is struck by lightning and aligns all the iron particles inside it in the same direction, creating poles. The force these rocks cause, which attracts and repels, is what we call magnetism.

WHAT MATERIALS ARE MAGNETIC? Some metals are magnetic: iron, nickel and cobalt are magnetic. Things that are made with iron, nickel and cobalt will be attracted to a magnet. Most other metals are not magnetic. Aluminum, copper, and magnesium are not magnetic. Precious metals like gold and silver are not magnetic.

The atoms that make up iron, nickel and cobalt, can all be aligned in the same direction creating poles. That's what makes them magnetic—what allows them to be magnetized. Sometimes, if metals are placed in a magnetic field, even if they are not magnetic, they become magnetized just a little bit.

Materials like glass, plastic, cloth, and wood are not magnetic.

WHAT IS A MAGNET? A magnet is a piece of iron or other magnetic metal in which all the atoms point in the same direction. All north seeking atoms point one way (North seeking pole or N) and all the south seeking atoms point in the opposite direction (South seeking pole or S). A magnet attracts anything made of iron, nickel or cobalt. And if a piece of iron is attached to a magnet, it also becomes magnetic—it attracts other pieces of iron. The N poles of magnets pull toward —attract—the S pole of other magnets. The N poles of magnets push away—repel—the N poles of other magnets. The S poles of magnets also repel the S poles of other magnets. An easy way to think of this is to say that like poles repel and unlike or opposite poles attract.



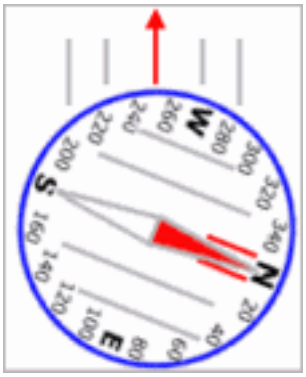
MAGNETIC HISTORY In the 1100s, The Chinese discovered that when lodestones or magnets were allowed to float in a bowl of water, the lodestone or magnet would align itself along the earth's north-south axis.

The Chinese began using these needles as compasses in the 11th century. Compasses provided a way to navigate out of sight of landmarks when there were no stars or sun or moon to use for navigation. Eventually the compass was perfected and it became a very critical part of navigation.

In the early 1820s, scientists found that currents of electricity also create magnetic fields. An electric current, like lightning, can make magnets. Now we make magnets by passing a piece of iron through an electric field. The electric field aligns all the iron atoms in the same direction.

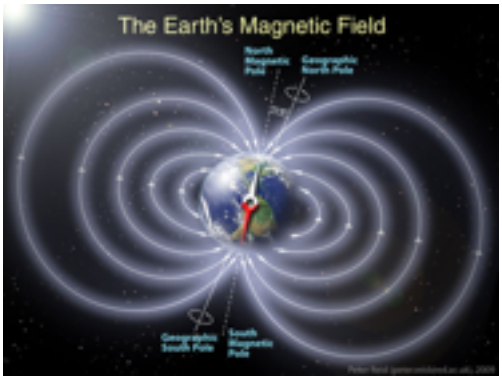
USES OF MAGNETS We use magnets to lift weights, keep cabinet doors closed, find sunken ships, find treasure with metal detectors, find deadly mines left over from war time. We can even use magnetism to look inside our bodies. MRI's which doctors use to see whether we've hurt a muscle, are Magnetic Resonance Images. Spinning magnets inside wire coils generates electricity—to light homes, to roll up the windows in the car or operate the radio. They make motors run.

We use magnetism in compasses to find our way. Imagine the Age of Exploration when Columbus set out across an unknown ocean without a compass. They could use the sun and the stars for navigation, that's true, but what if it was cloudy for days? They would waste precious time and with limited provisions, time was something that could not be wasted.



And we're not the only ones who use magnetism to navigate. Birds and whales may use magnetism to orient themselves during migration.

EARTH IS A MAGNET The earth itself is a magnet, with a north magnetic pole and a south magnetic pole. It has a magnetic field around it. This magnetic pole is what pulls the needle in a compass and allows us to use it for finding our way. But, as Dena found out in *Magnetic Magic*, the north magnetic pole is not the same as the north geographic pole. The north and south magnetic poles move. The north magnetic pole has been in Antartica before.



QUESTIONS TO PONDER:

- What makes a successful magic show/magician?
- Would you have gone like Columbus out into an uncharted ocean when you didn't know for sure what was on the other side?
- Why do you think some animals use magnetism to guide them on migrations?
- Can you think of a use for magnets that we haven't discussed?

WRITING ACTIVITY - SHORT PROMPT:

- Describe a *Magnetic Magic Show.* Use great descriptive words and strong verbs.
- Write a story about a person who finds a lodestone for the first time. Write about the things that might stick to it.

CLASSROOM ACTIVITY:

- Demonstration of Magnetism
- "Magic" Show

MORE INFORMATION:

From Arbordale Publishers:

For Creative Minds:

http://www.arbordalepublishing.com/ForCreativeMinds/MagneticMagic_FCM.pdf

Teaching Activities Guide:

http://www.arbordalepublishing.com/documents/TeachingActivities/MagneticMagic_TA.pdf

Quizzes:

http://www.arbordalepublishing.com/quize.php?title_id=243&q_type=1;

http://www.arbordalepublishing.com/quize.php?title_id=243&q_type=2

http://www.arbordalepublishing.com/quize.php?title_id=243&q_type=3

Resources - Demonstrations of quasi-magnetism:

http://terpconnect.umd.edu/~wbreslyn/chemistry/is-copper-magnetic.html

http://terpconnect.umd.edu/~wbreslyn/magnets/is-lead-magnetic.html

http://terpconnect.umd.edu/~wbreslyn/magnets/is-nickel-magnetic.html

http://terpconnect.umd.edu/~wbreslyn/magnets/is-silver-magnetic.html

http://terpconnect.umd.edu/~wbreslyn/magnets/is-stainlesssteel-magnetic.html

http://terpconnect.umd.edu/~wbreslyn/magnets/is-titanium-magnetic.html

Author's Website:

http://www.terrycjennings.com/Teacher-and-Parent-Resources.html

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http://mta.maryland.gov/sites/default/files/DowntownBaltimoreVisitorsMap.pdf Visitors' Map of Baltimore. Used to determine that 10° on a map.

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"From Continental Drift to Plate Tectonics." Columbia University. http://www.columbia.edu/~vjd1/devel_pl_tect.htm

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