

Name: \_\_\_\_\_

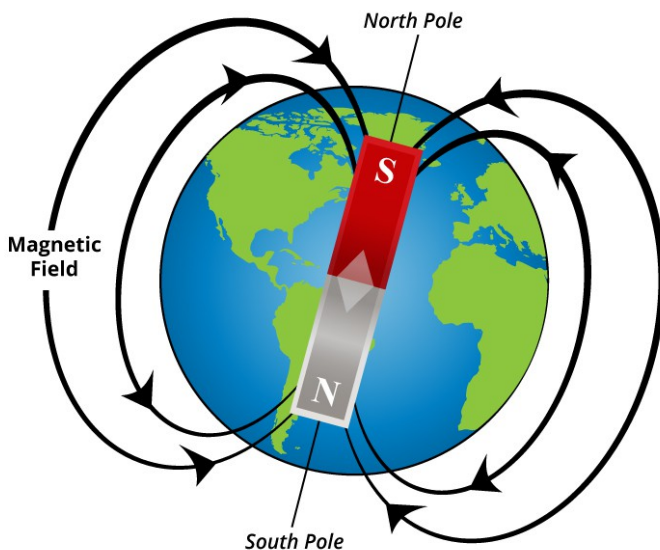
# The Force Be with You!

by Cindy Sherwood

After you draw a special picture, you might display it on your refrigerator so everyone can admire it. Chances are, you will place a magnet over the drawing to hang it up. But how does that work? Why does the magnet stick to the refrigerator and not just drop to the ground?

A magnet has special invisible powers that produce a magnetic field. You can feel the force from this field when you hold two magnets together. The magnets will either attract—meaning they will pull toward one another—or they will repel, meaning they will push away from one another. Although it may seem like magic, that force comes from tiny particles called electrons inside an atom. In certain types of metals, electrons spin around and pair off in different ways than they do for other types of materials. That activity is what creates the magnetic field.

You will not have any luck if you try to make a magnet out of plastic or rubber or wood or glass. Only certain kinds of metals are magnetic. The most common metals attracted to magnets are iron, nickel, and cobalt. Other metals, including gold, silver, and copper, are not attracted to magnets.



So what is the biggest magnet on Earth? If you guessed Earth itself, you would be right. Scientists believe that the deepest part of the Earth, its core, is made up of a mixture of iron and nickel. That gives Earth its own magnetic field which extends far into space. The magnetic field acts as a giant stop sign against solar wind, high-speed particles that blow from the sun.

Thanks to the earth's magnetic field, we are protected from danger from this solar wind.

Magnets help us in our daily lives, too. Just about anything with an electric motor uses magnets. So do computers and cell phones. When doctors need to find out why a patient is sick, they may order magnetic resonance imaging, or a MRI, to give them a peek inside the body without having to do surgery. And if you have ever used a compass while on a hike, you are actually using a small magnet that always points north.

What if you tried that magnet-refrigerator trick and your picture fell down right away? It probably means that your fridge is made of stainless steel, which contains a high amount of a nonmagnetic material. To hang up your picture, you will have to use old-fashioned scotch tape.



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1. Where does the force that creates a magnetic field come from?

- a. the activity of protons in atoms
- b. the activity of neutrons in atoms
- c. the pairing off of atoms in certain types of metals
- d. the pairing off of electrons in certain types of metals

2. Describe what happens when magnets attract? What happens when magnets repel?

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3. According to the information in the article, the Earth acts like a giant magnet. Which of the following is correct about the Earth's magnetism?

- a. Earth's mantle is made up of silver and nickel, which gives it a magnetic sphere.
- b. Earth's core is comprised of iron and nickel, which causes its magnetic field.
- c. The core of the Earth is made up of iron and copper, giving it a magnetic field.
- d. The mantle of the Earth is comprised of gold and cobalt, causing its magnetic sphere.

4. Magnets can be used in everyday life. What does MRI stand for? What does the magnetism in an MRI help accomplish?

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5. A magnet will attract to many types of surfaces. Which of the following surfaces will a magnet not be attracted to?

- a. iron
- b. cobalt
- c. stainless steel
- d. nickel

Name: \_\_\_\_\_

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The following terms are vocabulary words from the article. Match the vocabulary word with its correct definition by writing the corresponding letter on the line.



- |                         |  |
|-------------------------|--|
| 1. _____ magnetic field | a. charged particles that stream out from the Sun  |
| 2. _____ electrons      | b. the basic unit of all elements; a very small particle   |
| 3. _____ force          | c. to push back from something; resist   |
| 4. _____ solar wind     | d. the area around a magnetic material in which a magnet will be close enough to react to that material                |
| 5. _____ magnet         | e. materials that are often characterized as hard, shiny, and conductive; magnets are attracted to many types of these |
| 6. _____ core           | f. the strength or energy of something   |
| 7. _____ attract        | g. negatively charged particles inside an atom   |
| 8. _____ atom           | h. the deepest layer of the Earth  |
| 9. _____ metals         | i. A piece of material whose atoms are arranged so that it attracts other materials with the same atomic pattern       |
| 10. _____ repel         | j. to pull something closer; draw something in   |



## ANSWER KEY

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1. Where does the force that creates a magnetic field come from? **d.**

- a. the activity of protons in atoms
- b. the activity of neutrons in atoms
- c. the pairing off of atoms in certain types of metals
- d. the pairing off of electrons in certain types of metals**

2. Describe what happens when magnets attract? What happens when magnets repel?

**When magnets attract, they will pull toward one another.**

**When magnets repel, they will push away from one another.**

3. According to the information in the article, the Earth acts like a giant magnet. Which of the following is correct about the Earth's magnetism? **b.**

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4. Magnets can be used in everyday life. What does MRI stand for? What does the magnetism in an MRI help accomplish?

**MRI stands for magnetic resonance imaging. The MRI helps doctors see inside patients without surgery.**

5. A magnet will attract to many types of surfaces. Which of the following surfaces will a magnet not be attracted to? **c.**

- a. iron
- b. cobalt
- c. stainless steel**
- d. nickel

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| 2.  | <u>g.</u> electrons      | <u>b.</u> the basic unit of all elements; a very small particle   |
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