Electricity and Magnetism

Chapter 1
Magnetism
What Is Magnetism?

This section describes the properties of a magnet and explains how magnetic poles interact. The section also describes the shape of a magnetic field.

Use Target Reading Skills

Before you read, look at the headings and visuals to see what this section is about. Then write what you know about magnetism on the lines below. As you read, write what you learn.

<table>
<thead>
<tr>
<th>What You Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Magnets stick to refrigerators.</td>
</tr>
<tr>
<td>2. _______</td>
</tr>
<tr>
<td>3. _______</td>
</tr>
<tr>
<td>4. _______</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What You Learned</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. _______</td>
</tr>
<tr>
<td>2. _______</td>
</tr>
<tr>
<td>3. _______</td>
</tr>
<tr>
<td>4. _______</td>
</tr>
</tbody>
</table>

Properties of Magnets

1. What is a magnet?
What is Magnetism? (continued)

2. Circle the letter of the mineral in rocks that is magnetic.
   a. magnesia  
   b. polaris
   c. magnetite  
   d. iron

3. The attraction or repulsion of magnetic materials is called
   ____________________

4. Is the following sentence true or false? Magnetic rocks are known as
   lodestones. ____________________

5. What are three properties that magnets have?
   a. ____________________________________________
   b. ____________________________________________
   c. ____________________________________________

Magnetic Poles

6. Any magnet, no matter what its shape, has two ends, each one called
   an(a)n ____________________

7. Circle the letter of each sentence that is true about magnetic poles.
   a. One pole of a magnet will point north.
   b. Both the north and the south pole always point north.
   c. Two north poles make up a pair of unlike, or opposite, poles.
   d. The pole that points south is labeled the south pole.

8. Where is the magnetic effect of a magnet strongest?
   ____________________

9. How are magnetic poles labeled?
   ____________________
Magnetism - Guided Reading and Study

10. Complete the table below by writing whether the magnets in each pair described in the first column will repel or attract each other.

<table>
<thead>
<tr>
<th>Magnetic Attraction</th>
<th>Repel or Attract?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two south poles are brought together.</td>
<td>a.</td>
</tr>
<tr>
<td>A north pole is brought to a south pole.</td>
<td>b.</td>
</tr>
<tr>
<td>Two north poles are brought together.</td>
<td>c.</td>
</tr>
<tr>
<td>A south pole is brought to a north pole.</td>
<td>d.</td>
</tr>
</tbody>
</table>

11. What is magnetic force?

12. Is the following sentence true or false? Any material that exerts magnetic force is considered a magnet.

Magnetic Fields

13. The region of magnetic force around a magnet is known as its

14. What are the lines called that map out the magnetic field around a magnet?

15. Draw a magnetic field around the illustration of the bar magnet shown here.

16. When the magnetic fields of two or more magnets overlap, what is the result?
Magnetism · Guided Reading and Study

Inside a Magnet

This section explains how an atom can behave like a magnet. It also describes how atoms in magnets are arranged and how magnets can be changed.

Use Target Reading Skills

Before you read, preview the red headings. In the graphic organizer below, ask a what or how question for each heading. As you read, write the answers to your questions.

<table>
<thead>
<tr>
<th>Inside an Atom</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Question</td>
<td>Answer</td>
</tr>
<tr>
<td>What are the three particles that make up an atom?</td>
<td>a. The three particles that make up an atom are:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Atom

1. What do the magnetic properties of a material depend on?

_________________________________________________________________

_________________________________________________________________

2. The smallest particle of an element that has the properties of that element is called a(n) _______________________.

3. One of about 100 basic materials that make up all matter is called a(n) _______________________.

4. What is the center region of an atom called? _______________________.

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5. What is the difference between protons and electrons?


6. Why does each electron in an atom behave like a tiny magnet?


7. Is the following sentence true or false? Most materials have weak magnetic properties. ______________________

8. Why do some atoms have strong magnetic properties?


Magnetic Domains

9. What is a magnetic domain?


10. Is the following sentence true or false? An entire magnetic domain acts like a bar magnet with a north and a south pole. ______________________

11. How are magnetic domains arranged differently in a magnetized material and in a material that is not magnetized?


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Inside a Magnet  (continued)

12. What is a ferromagnetic material?

13. What are four common ferromagnetic materials found in nature?

14. Today, the most commonly used magnets are made from a material called ____________________.

Making and Changing Magnets

15. What are two ways to make a magnet from an unmagnetized ferromagnetic material?

16. If a paper clip is rubbed in one direction against a strong magnet, what does the magnetic field of the magnet cause to occur in the paper clip?

17. What is a temporary magnet?

18. A magnet made of a material that keeps its magnetism is called a(n) ____________________.

19. What might happen if you drop a permanent magnet or strike it hard?
Magnetism  •  Guided Reading and Study

20. Is the following sentence true or false? Above a certain temperature, a material loses the property of ferromagnetism. ___________________

21. Suppose you break a magnet into four pieces. What will be the magnetic properties of each piece?

22. If a magnet is cut in half, why do the shorter pieces still have strong ends made up of many north or south poles?
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1. What is a compass?

2. Which way does a compass needle usually point?

Earth as a Magnet

3. How is Earth like a bar magnet?

4. The poles of a magnetized needle on a compass align themselves with Earth’s _________________.

5. What occurs in Earth’s core that is related to Earth’s magnetism?

6. Is the following sentence true or false? The magnetic poles are not located exactly at the geographic poles. ________________

7. The angle between a line to the geographic north pole and a line to the north to which a compass points is known as _________________.

8. Is the following sentence true or false? The magnetic declination of a location never changes _________________.

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Magnetic Earth (continued)

Earth's Magnetic Field

9. Why can Earth itself make magnets out of ferromagnetic materials?

10. How could Earth's magnetic field magnetize an iron bar over many years?

11. The magnetic record in the rock on the ocean floor depends on when the rock was ________________.

12. Circle the letter of each statement that is true about the permanent record of Earth's magnetic field.
   a. When rock is molten, the iron it contains lines up in the direction of Earth's magnetic field.
   b. Molten rock contains no magnetic material.
   c. As molten rock cools and hardens, the iron it contains is locked in place.
   d. Rock produced on land seeps into the ocean and hardens on the ocean floor.

13. Is the following sentence true or false? Earth's magnetic field has reversed direction every million years or so. ________________

The Magnetosphere

14. The doughnut-shaped regions 1,000–25,000 kilometers above Earth are called the ________________.

15. What do the Van Allen belts contain?

________________________________________________________________________

________________________________________________________________________

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16. The stream of electrically charged particles flowing at high speeds from the sun is called the ________________.

17. Circle the letter of the sentence that explains Earth's magnetosphere.
   a. The doughnut-shaped region 1,000 kilometers above Earth
   b. The region of Earth's magnetic field shaped by the solar wind
   c. The region between the geographic north pole and the magnetic north pole
   d. The region of Earth's magnetic field in the Van Allen belts

18. What is an aurora?

   ________________

19. Complete the flowchart about what causes an aurora.

   Particles from the solar wind penetrate Earth's ________________.

   The particles follow the lines of Earth's magnetic field to the magnetic ________________.

   When particles get close to the surface, they interact with atoms in the ________________.

   The interaction causes the atoms to give off glowing ________________. 
Magnetism · Key Terms

Key Terms

Answer the questions by writing the correct Key Terms in the blanks. Use the numbered letters in the terms to find the hidden Key Term. Then write the definition for the hidden Key Term.

Clues | Key Terms
-----|------
1. The area of magnetic force around a magnet | _______ 1 2 3 4 5
2. A stream of electrically charged particles from the sun | _______ 6 7 8
3. A glowing region in the atmosphere | _______ 9 10
4. A device that has a magnetized needle that spins freely | _______ 11 12 13
5. The region of Earth’s magnetic field shaped by solar wind | _______ 14
6. Any material that attracts iron and materials that contain iron | _______ 15 16
7. An end of a magnet | _______ 17
8. The attraction or repulsion between magnetic poles | _______ 18

Key Term: _______

Definition: __________________________

______________________________

______________________________

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Magnetism - Connecting Concepts

Connecting Concepts

Develop a concept map that uses Key Concepts and Key Terms from this chapter. The concept map shown is one way to organize how the information in this chapter is related. You may use an extra sheet of paper.

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