

## Chapter 15 – Magnetism

### Chapter 15 Review

#### Understanding Vocabulary

Select the correct term on page 378 to complete the sentences.

1. The angular difference east or west of true north as indicated by a compass is known as \_\_\_\_\_.
2. In a drawing, the spacing of the \_\_\_\_\_ surrounding a magnet indicates the strength of the magnetic field at a given location.
3. Water, which is weakly repelled in the presence of a strong magnetic field, is considered a(n) \_\_\_\_\_ material.
4. A needle suspended in a magnetic field that orients itself parallel to the field is an example of a(n) \_\_\_\_\_.

#### Reviewing Concepts

##### Section 15.1

1. What is a magnetic material able to do?
2. Suppose you stick a magnet on the door of your refrigerator. Is the magnet a magnetic material or a permanent magnet? Is the refrigerator door a magnetic material or a permanent magnet? Explain.
3. Is it possible to have a south pole without a north pole or a north pole without a south pole? Explain.
4. What happens to a magnet if it is cut in half?
5. Two magnetic north poles \_\_\_\_\_ each other. Two south poles \_\_\_\_\_ each other. A north pole and a south pole \_\_\_\_\_ each other.
6. Can magnetic forces pass through non-magnetic materials? Explain.

7. List three uses for magnetism.
  - a.
  - b.
  - c.
8. What describes the magnetic force in the space around a magnet?
9. Draw a bar magnet and sketch the magnetic field lines around it. Include arrows to show the direction of the lines.
10. Magnetic field lines outside a magnet point away from its \_\_\_\_\_ pole and toward its \_\_\_\_\_ pole.
11. What information can you get by looking at the spacing of magnetic field lines?
12. What happens to the strength of the magnetic field as you move away from the magnet?

### **Section 15.2**

13. Explain the design of a simple electromagnet.
14. What is the purpose of the core of an electromagnet?
15. Explain how you can use the right-hand rule to determine the location of an electromagnet's poles.

16. What happens to an electromagnet's field if the current is increased?
17. What happens to an electromagnet's field if the direction of the current is reversed?
18. Describe two ways you can increase the strength of an electromagnet without increasing the current.
  - a.
  - b.
19. Why is it not always the best idea to increase the electromagnet's strength by simply increasing the current?
20. What advantages do electromagnets have over permanent magnets when used in machines?
21. Are diamagnetic materials magnetic? Why or why not?
22. Are paramagnetic materials magnetic? Why or why not?
23. What happens inside a paramagnetic material if a permanent magnet is brought close by? What happened when the permanent magnet is removed?
24. List three ferromagnetic materials.
  - a.
  - b.
  - c.
25. What are magnetic domains?

26. Which materials are more strongly magnetic, ferromagnetic or paramagnetic? Why?
27. Describe how to create a permanent magnet from a ferromagnetic material.
28. What is the difference between hard magnets and soft magnets?
29. Which is easier to magnetize, a hard magnet or a soft magnet? Once magnetized, which is easier to demagnetize?
30. List several ways to demagnetize a permanent magnet.

### **Section 15.3**

31. For what purpose did people first use magnetism?
32. Describe the design of two early compasses.
- a.
  - b.
33. Explain why the two ends of a magnet are called “north pole” and “south pole.”
34. Is Earth’s magnetic north pole at its geographic north pole? Explain.

35. Why does a compass point north?
  
36. Why is it important to know the magnetic declination in a region where you are using a compass to navigate?
  
37. How does the strength of Earth's field compare to the strength of the field of average permanent magnets?
  
38. What material is at the core of Earth?
  
39. What do scientists believe is the source of the Earth's magnetism?
  
40. What has happened to the strength and location of the Earth's magnetic field in the past?
  
41. If the current trend continues, how long do scientists think it will take for Earth's magnetic poles to reverse again?

### **Solving Problems**

#### **Section 15.1**

1. A student knocks a ceramic permanent magnet off her desk, and it shatters when it hits the floor. Copy the broken pieces shown at the top of page 379 and label the north and south poles on each.
  
2. The diagram on page 379 shows the magnetic field in a region. The source of the field is not shown. At which of the labeled points in the diagram is the magnetic field the strongest? At which point is it the weakest? Explain your answers.

3. Copy the picture of the horseshoe magnet on page 379 and draw the magnetic field around it.

### **Section 15.2**

4. Which picture on page 380 shows the correct location of the north and south poles of the electromagnet? Explain.
5. A permanent magnet attracts a steel pin as shown on page 380. The pin has become a soft magnet. Copy the picture then use what you know about magnetism to label the north and south poles of the pin.
6. A strong permanent magnet is brought near a piece of iron. Magnetic domains are created as shown. Which pole of the permanent magnet is closest to the iron?

### **Section 15.3**

7. Suppose Earth's magnetic field were to change as shown at bottom of page 380. If you stand at the marked point, in which direction will your compass needle point? What is the approximate magnetic declination at this point?