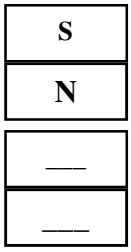
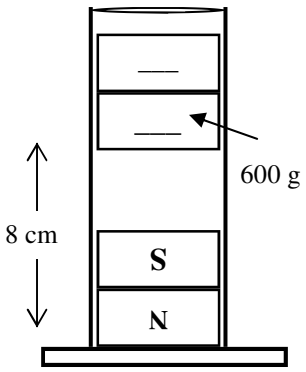
A-day Fri., 5/13
B-day Mon., 5/16

2011 PreAP Magnetism 1

1. Magnets have two sides called: _____.
2. Instead of positive and negative they are called: _____ and _____.
3. In the diagram at the right, the two magnets are attracted to each other. Label the blanks on the lower magnet.



4. Two magnets are placed inside a graduated cylinder. The upper magnet is suspended in the air because it is being repelled by the lower magnet (*called magnetic levitation [MagLev*}).
   A. Label the poles of the top magnet.
   B. Since 1000g = 1 kg, the object has a mass of _____ kg.
   C. What is the weight of the suspended magnet?
   D. What would be the mass of the upper magnet in space?
   E. How much force is the bottom magnet exerting on the top magnet?

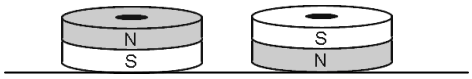


   F. How much force is the top magnet exerting on the lower magnet.
   G. This must be true due to which of Newton's Laws?
   H. Remembering to use meters, calculate the energy of the upper magnet.

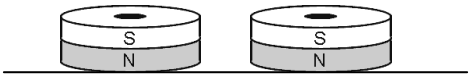
   I. If the lower magnet were removed and the upper magnet was allowed to fall from its present height, how fast would it be going when it hits the bottom of the cylinder?

5. Two circular magnets are placed on a table next to each other.

A. Attract or repel?



B. Attract or repel?



For the next few questions you will need a magnet. Either borrow one off the refrigerator or borrow one BEFORE class starts. (We actually did this in the lab, already.)

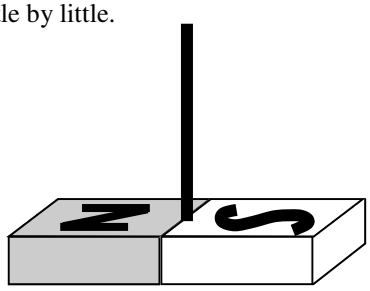
6. Which of the following are attracted to magnets?
   A. Aluminum? B. A penny (copper)? C. A paper clip (steel [has iron in it])?

7. A magnet will pick up any piece of metal. True or False?

8. Find something to which the magnet is attracted. Pull the magnet away from the object, little by little.
   A. Does the magnetic force increase or decrease?
   B. Does magnetic force increase or decrease with distance?
   C. So, is the magnetic force (F_B) directly or inversely proportional to distance?

From the book, starting p. 766, paragraph 1.

9. A bar magnetic as seen at the right, is suspended by a string so that it is free to turn.
   A. Which side of the magnet points toward the earth's north pole?
   B. The magnet stops moving in the position shown, which side of this piece of paper is facing toward the earth's north pole?
   C. So, the earth's geographic north pole is what pole of the earth's internal magnetic field?



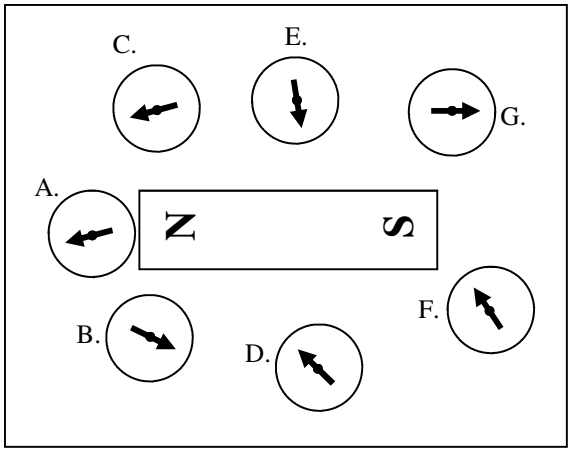
10. Describe how to separate a north from a south pole (*p.766 bottom*).

11. Give two ways to magnetize a piece of iron.

12. Give two ways to unmagnetize the iron.

13. What is a soft magnetic material (and give an example)?

14. What is a hard magnetic material (and give an example)?



15. What letter do we use for the magnetic field?

16. Study Figure 21-2 in the book (p767, top).
    A. Magnetic field lines always point from ____ to ____.

    Just like with electric field lines, when the magnetic field lines are closer together, the field strength is greater.
    B. In the diagram at the right, which compasses are correct?

17. How is the direction of B (the magnetic field) defined (*see above*)?

18. Magnetic fields (B) are vectors. The magnetic field of the earth (B_{earth}) = 5.0×10^{-5} T, north. At a particular point, the magnetic field due to a wire (B_{wire}) = 3.0×10^{-5} T and is pointing directly east. Calculate the net magnetic field and the direction a compass would point. (*You have x and y components. Figure it out.)*

19. Describe the difference between the magnetic and geographic north poles of the earth (p.*767, bottom*).

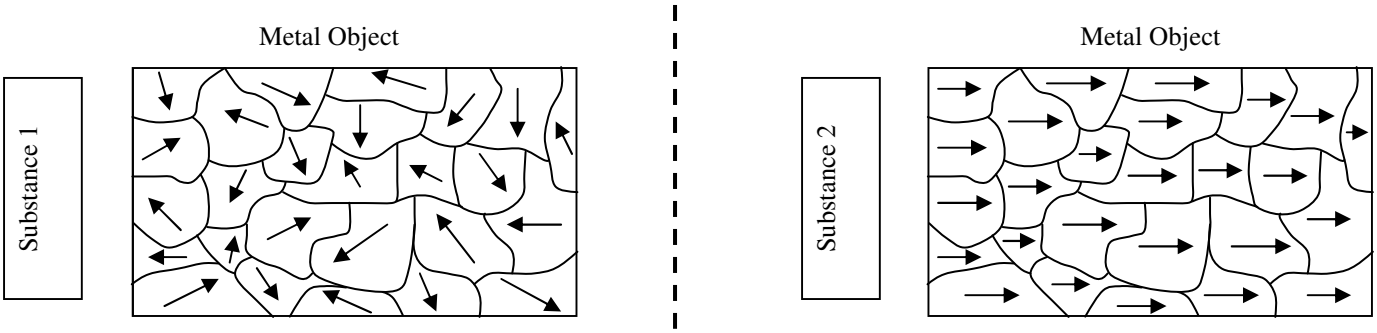
20. Where does the earth's magnetic field come from (*p. 768*).

Turn to p.772—

21. What is the classical explanation of the origin of magnetism?

22. Why is it that most materials are not magnetic?

23. What three metals tend to have magnetic properties? Why are they magnetic?



24. Substance 1 is placed next to a piece of metal. Then Substance 1 is removed and Substance 2 is placed next to the metal object. The microscopic view of the metal object is shown for both situations and occurs immediately. The small regions represent the ***magnetic domains*** described on p. 772 in the book.

    A. Which substance is magnetic: Substance 1 or Substance 2?
    B. Justify your answer.
    C. For the magnetic substance you chose in part A, above, label its North and South magnetic poles.
    D. Is the metal object a soft or hard magnetic substance?
    E. Why?
    F. What type of metal is the metal object, most likely?
    G. A non-ferrous material (one that cannot be magnetized) would look like which picture: left or right?