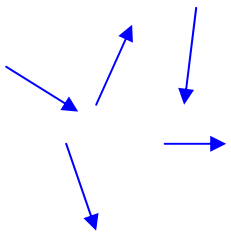
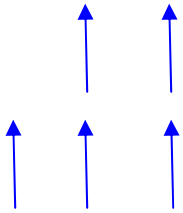
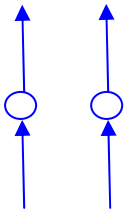
p57 Solutions

1. State whether there is repulsion, attraction or neither.

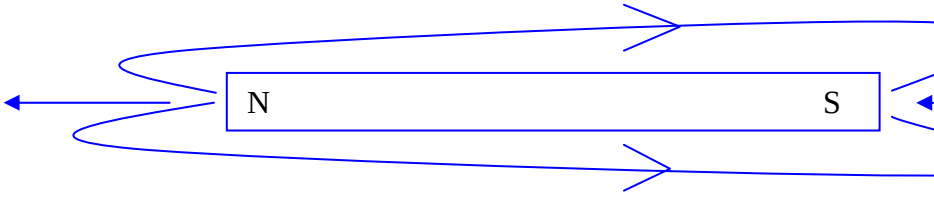
A. N and S ends of two magnets
attraction
B. S and S ends of a magnet
repulsion
C. S end of magnet and ferromagnetic material
attraction
D. N end of a magnet and Cu no reaction
E. Two ferromagnetic materials; neither is a permanent or temporary magnet no reaction

2. Draw the domains, if any, for each of the following:

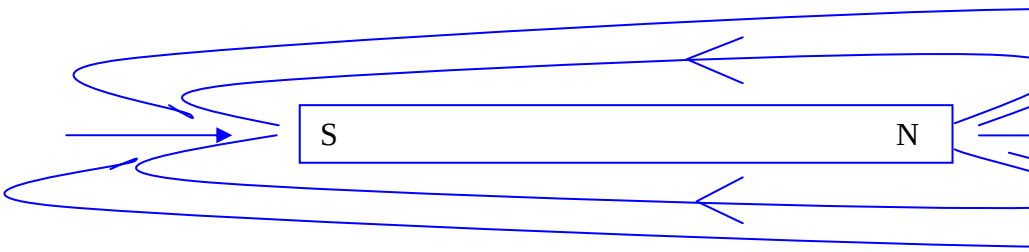
a. Cu	b. Fe not near a magnet	c. pure Fe near a magnet	d. Fe with impurities. It sticks to another iron nail.
			

3. a. In #2, which one was non-magnetic? a
b. a permanent magnet? d
c. A temporary magnet c

4. Draw the magnetic field lines around the following bar magnet.



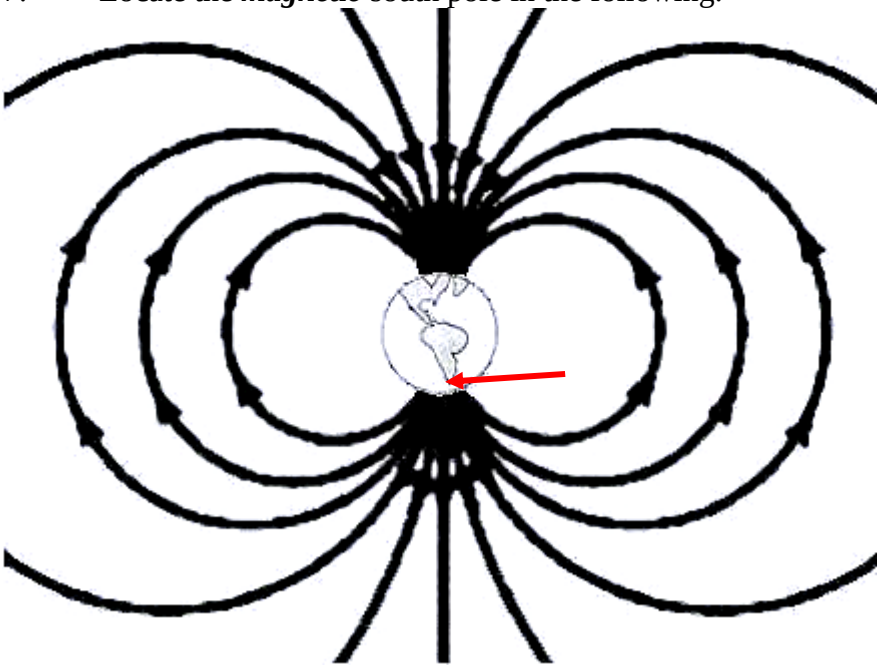
5. Now here is a stronger bar magnet. Draw the field lines again.



6. Explain how we obtain magnetic field lines. How do we know they really exist? What experiment can be performed to reveal their existence?

You can sprinkle iron filings in an oil trapped within a casing. If there is a plastic-covered insert at the core, you can slide an iron magnet into it, and the iron filings will align themselves along the3-D magnetic field. The best way of revealing direction is to move a compass around a magnet. Since the compass needle always aligns itself in the direction of the magnetic field, you can simply keep track of the way the needle-direction keeps changing, and you will have a type of contour map revealing the

7. Locate the ***magnetic*** south pole in the following.



8. How can a permanent magnet be ruined? List two ways and explain what happens.
   a. heating it
   b. banging it

   Both actions can scramble the domains.

9. Neodymium magnets are actually made up of Nd, B and Fe, while many iron magnets consist of Al, Ni and Co.

   a. Pick out the non magnetic material from each trio. B and Al
   b. Explain why it is included. The impurities lock the domains into place.

10. TRUE? Or FALSE?

   a. When an electron spins around the nucleus, it creates a magnetic field._T__
   b. An electron spinning in a direction opposite to that of another electron will create a magnetic field pointing in the opposite direction, canceling the first field._T__

c. A group of atoms with magnetic field lines that strengthen each other is known as a *domain*.__T_
d. Aluminum, lithium and gallium form domains_F__
e. Ferromagnetic elements include iron, cobalt, nickel and neodymium._T__
f. In a strong magnetic field, the domains of a ferromagnetic element get scrambled in all directions.__F____
g. If impurities lock domains into an aligned state, we have a permanent magnet___T ___
h. Lodestone, compasses and horseshoe magnets are examples of temporary magnets. __F__