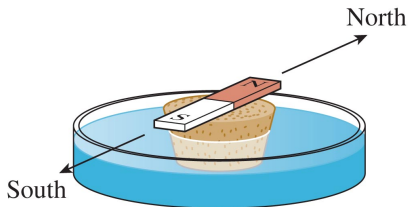


# The Magnetic Field (Chapter 33)

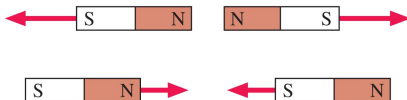
- Now, it is time for magnetism! Another major topic change.
- You all know about magnets already, since you use them to post your artwork on your fridge.
- You also carry around, listen to or somehow use objects build with magnets in your everyday life.
- You can tell that electricity and magnetism are related by how often we say EM. However, historically they are completely distinct phenomena.
- Magnetism was also understood in a macroscopic sense before the microscopic basis was known.
- We will try to get a feeling for both the macroscopic and microscopic pictures of magnetism and for the relationship between electricity and magnetism.

# Things You Already Know About Magnetism (33.1)



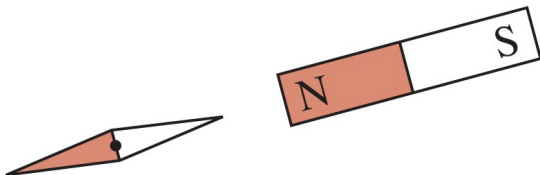
The needle of a compass is a small magnet.

Copyright © 2008 Pearson Education, Inc., publishing as Pearson Addison-Wesley

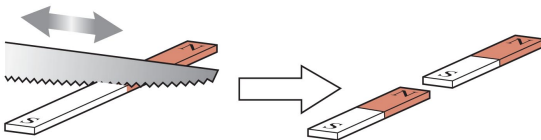


Copyright © 2008 Pearson Education, Inc., publishing as Pearson Addison-Wesley

# Things You Already Know About Magnetism

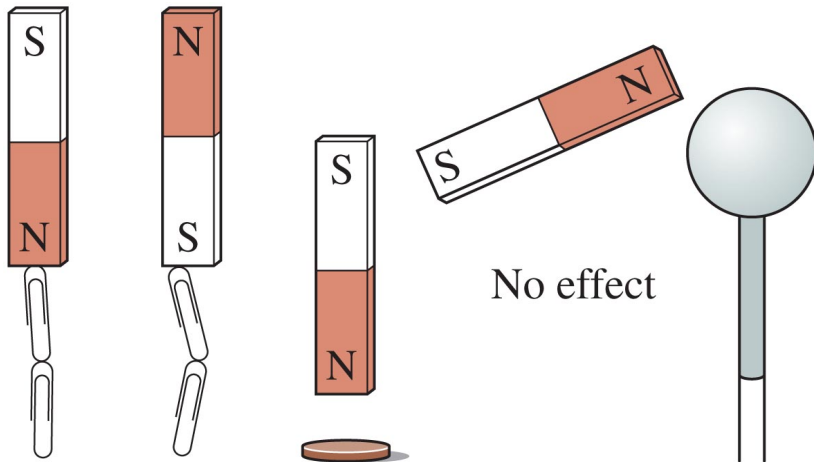


Copyright © 2008 Pearson Education, Inc., publishing as Pearson Addison-Wesley.



Copyright © 2008 Pearson Education, Inc., publishing as Pearson Addison-Wesley.

# Things You Already Know About Magnetism

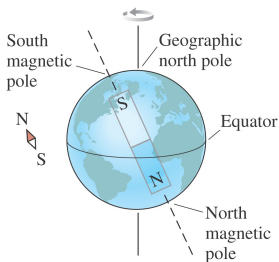


Copyright © 2008 Pearson Education, Inc., publishing as Pearson Addison-Wesley.

Copyright © 2008 Pearson Education, Inc., publishing as Pearson Addison-Wesley.

# Monopoles, Dipoles and Geomagnetism

- Every magnet which has ever been observed has had both a north and south pole...even if you cut 'em up!
- Experiment seems to tell us that all magnets are **dipoles**.
- People are actively searching for **magnetic monopoles**, since there is no reason for them not to exist....but no luck yet...



- The “north” end of a magnet is “north seeking” on the earth.
- This must mean that the geographic north pole of the earth is actually near a magnetic south pole! The north-seeking side of a compass needle would be repelled by a magnetic north pole...

# The Discovery of the Magnetic Field (33.2)

- The connection between electricity and magnetism was discovered in 1816 by Oersted during a classroom lecture demonstration!
- He happened to leave a compass nearby while doing an electricity demo and saw the needle move.
- It turns out that a charge distribution (ie. an electric field) has no effect on a compass needle. However, a moving charge distribution (ie. a current) produces a force which moves the needle.
- Current generates a magnetic field!

