PHYSICS

MAGNETISM

MAGNETISM

Definition:

The first descriptions of magnetic properties date back before 500 B.C. when mysterious rocks were found to attract pieces of iron. The rock was called ***Loadstone*** and because it attracts iron is said to be ***Ferromagnetic***.

***Ferromagnetic* -**

A magnetic force is created by concentrating magnetic field lines. There are two points on all magnets where magnetic field lines come close together. These concentrated areas are called ***Poles***.

2 Poles:

Laws of Magnetism

1.
2.
3.

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MAGNETIC FIELD LINES

Magnetic Field Lines:

1.

2.

3.

4.

PROPERTIES OF MAGNETIC FIELD LINES

1.

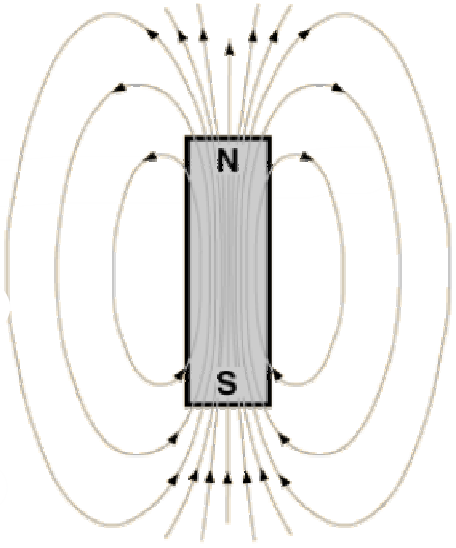
2.

3.

4.

5.

6.



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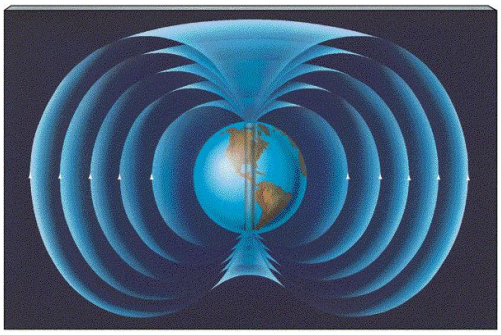
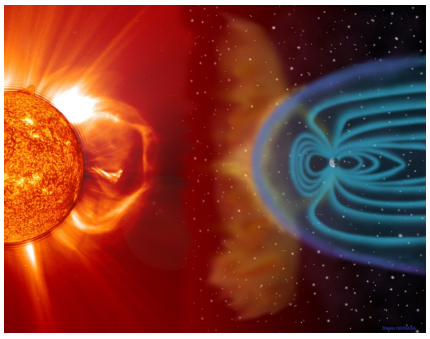
Magnetic Field of the Earth

The magnetic field of the Earth is very similar to that of a bar magnet. The concentration of these magnetic field lines can be found near the poles of the planet. Not only do these magnetic field lines help us to navigate around the Earth, they also deflect harmful cosmic rays so they don't strike the planet.



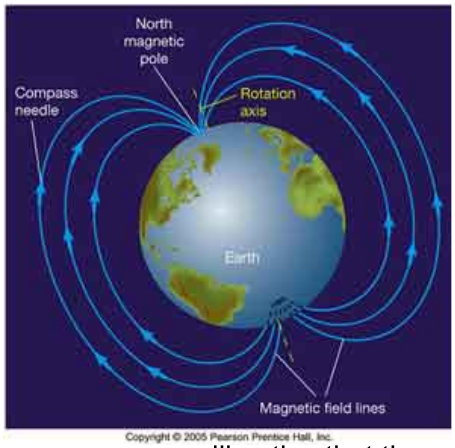


Magnetic Declination

A compass (or magnet) will point towards the *Magnetic North Pole*. This is the point where the magnetic field lines are concentrated at the top of the Earth. However, although close, this magnetic North differs from the *Geographical North Pole*. The angle between geographic North, or true North, and magnetic North is called ***magnetic declination***. A navigator using a magnetic compass must know the angle of declination in order to find true North.

Magnetic Inclination (or Dip)

The magnetic field lines surrounding the planet are not horizontal; they have a vertical component as well. Think of them like an airplane taking off from the South Pole and landing on the North Pole. Similar to the path of the airplane, the magnetic field lines change altitudes. They start off low to the Earth, incline and level off at the equator and then decline down to the Earth again.



If you are navigating using a magnetic compass, you will notice that the needle points up in the Southern hemisphere, levels at the equator, and then points down in the Northern hemisphere. The angle at which the compass inclines, or dips, is called ***magnetic inclination***. A navigator must know these angles to calculated latitude on the Earth.

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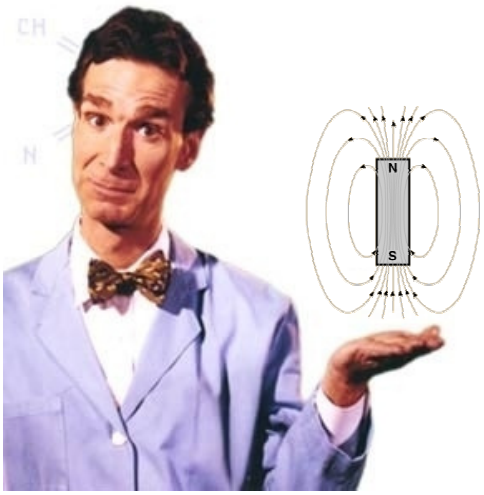
Bill Nye - Magnetism



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Homework

1. What is the name given to materials that are strongly attracted to one another by a magnet? Name two such materials, other that iron and steel.
2. Describe how a screw driver can become magnetized. What might happen if the screwdriver were heated or dropped? Explain your answer.
3. What name is given to the region in which a magnet influences other magnetic materials? How far does this region extend?
4. Describe two ways in which you could detect the presence of a magnetic field. Does any magnetic field exist in the spaces between magnetic field lines? Explain you answer.
5. Is the magnetic pole area in the northern hemisphere an N-Pole or an S-Pole? Explain.
6. Vertical retort-stands in laboratory classrooms are often found to be magnetized, and the polarity of such rods in Canada is opposite to the polarity of those found in Australia. Explain this statement.
7. Given two apparently identical bars of steel, one a permanent bar magnet and the other unmagnetized, and without the help of any other equipment, describe the method for determining which bar is the magnet.
8. Describe what would happen to a magnetic compass and to a dipping needle if each were placed **(a)** at the magnetic north pole, and **(b)** at the equator.