Lesson Plan for "Compass Creation"

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Introduction/Background Info

Prior to the advent of the compass, navigation rested primarily on the use of visual aids such as landmarks and stars to orient one's self. These methods proved difficult if vision was obscured, such as in a fog bank. However, with the discovery of loadstones and the compass, it became possible for sailors and explorers to orient themselves even without visual assistance. It played a major roll in the Age of Exploration and still plays a major roll in navigation.

Student Objectives

Gain an understanding of how a compass works and be ale to successfully navigate using one.

Topic(s)

Magnetism, Earth Science, Navigation

Overview of Lesson Process

Magnetism Overview:

All objects are made up of tiny particles called atoms. Atoms are composed of several different particles, including tiny negatively charged electrons that rotate around the atom nucleus. The electrons in the atoms of magnetic objects are all, or nearly all, spinning in the same direction around the nucleus. This is what causes an object to be magnetic, or, attracted to magnets. In each magnetic object there are many different groups of atoms, each forming its own mini-magnet, but these groups are in opposing directions to each other. In a magnet, these groups of atoms are aligned so that the mini-magnets are all pointing in the same direction. The term for this is *polarity*. This alignment of the groups of atoms is what makes an object a magnet.

Explanation of how a compass works:

A compass makes use of the directionality of the Earth's magnetosphere to cause a freely rotating magnetized needle to orient itself in a line though the magnetic north pole and magnetic south pole. It is as if the north end of the needle is being pulled towards a particular point on the earth's surface (the North Pole), much like the way gravity pulls everything towards the center of the earth. Since the needle always points in the same direction regardless of one's position, it is possible to tell in what direction you are moving by relating it to the direction that the needle points, i.e. North. For convenience, other directions are also given names. The direction 90 degrees clockwise of North is East, 180 degrees is South, and 270 degrees is West.

Compass Activities:

Once the compasses are constructed following the procedure below, allow the students to play around with them a little. For example, let them see what happens when a magnet is moved close to the compass. After they have become familiar with the way the compass works start the scavenger hunt. I think the best way to do this is to break the students up into groups, each with a mentor to help guide and assist as needed. Since the sites differ, the directions for the given scavenger hunts will be created by in the preceding DeCal by mentors familiar with each site. It is probably a good idea for the mentors to look around the sites the week before to get an idea of how to make a worth while and safe scavenger course. The directions should make use of the compass rose. For example, take 100 paces west, then 50 paces east. If time allows ask the students to identify the direction of certain objects around them using their compasses.

Materials

1. Plastic Bowls (preferably as large a radius as possible), or Pie Tins
2. Plastic Milk Jug Caps
3. Paper Clips straightened and cut into rods approx. 2 in long
4. Scotch Tape
5. Magnets
6. Candy Prizes

Procedures

Making the Compass:

1. To magnetize the paper clip, rub a magnet along its length then lift the magnet away from the metal to bring it back to the other end. Do this "wiping motion 10-20 times.
2. Once magnetized, place the paper clip across the bottom of the milk jug lid and secure with scotch tape
3. Fill a bowl or pie pan with water and float the milk jug lid upside down. The paper clip will orient itself in a north-south position.

Resources

http://adventure.howstuffworks.com/compass1.htm