

Soda Bottles—Good for Drinks and Astrophysics!

A magnetometer is a device used to measure the strength and direction of a magnetic field. They are used to measure the magnetic field of planets, and magnetic anomalies that can occur. Building a magnetometer can be used to illustrate the Earth's magnetic field and the way the Sun's magnetic activity affects it, and by extension, Earth. It is only appropriate that a museum with ties to a soft drink company uses soft drink bottles to explore Earth's magnetic field!

Bar magnet

About 2 feet of sewing thread

1 straw of any size

Clear tape

A piece of card-stock paper about 2x4"

A small reflective object

Empty 2-liter soda bottle.

Small rocks, sand, or other heavy ballast

Scissors

Instructions:

Lay the bar magnet flat on the piece of card-stock paper. Align the long edge of the bar magnet with the top of the short edge of the piece of paper. Make sure the paper is centered along the edge of the bar magnet and tape the magnet to the paper. Mark the north and south poles of the bar magnet.

Cut off a piece of the straw about 2

inches long. Center it on the long, thin side of the bar magnet and tape it to the bar magnet. Then...



Cut a piece of thread about 6 inches in length. Put one end of the string through the straw attached to your magnet, then tie the two ends together. This will cause a triangular shaped support string when held up.

Tie one end of the remaining thread to the newly formed triangular support thread.

Take your reflective object (a small mirror works well) and center it on the piece of paper hanging below the magnet. Tape the reflective object to the paper.

Cut off the top third of your 2-liter bottle. Place your ballast in the bottom portion of the bottle. Small rocks, sand, or anything heavy enough to weigh down and stabilize the bottle will work as ballast.

Cut or poke a small hole in the bottle cap large enough for your thread to pass through.

Place your thread through the hole in the cap.

Place the bar magnet and other pieces inside the bottle, and replace the top third of the bottle which you cut off earlier. The thread should run up through the bottle cap, suspending the bar magnet. Tape the bottle closed along the cut.

Move the thread from the bottle cap up and down to adjust the position of the magnet to a point where it is suspended in the air without touching the bottom (and ballast) or sides of the bottle. Tape the string firmly to the bottle cap so it does not move from that position.



When Complete:

The magnetometer's position can be tracked by shining a light or laser pointer off the reflector, and observing the position of the reflected light beam over time. The light beam probably will be most effective if it hits the mirror at an angle close to 45 degrees and then is aimed onto a white strip made of graph paper or a meter stick so that quantitative measurements can be made. Make absolutely sure the light source and the magnetometer are securely fastened down so that they don't shift, move or are otherwise affected by their surroundings. Check that the magnetometer is not in direct sunlight else the position of the mirror will be shifted by heating and cooling! Last, neither the light beam nor its reflection should be in position to enter anyone's eyes!! **TCA**

