

INSTRUCTIONAL GUIDE

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Recommended for Activities:

- [Plastic Covered Bar Magnets \(P8-1146\)](#)
- [3" U-Shaped Magnet \(P8-1137\)](#)



Introduction

The Magnetic Field Demonstrator offers a quick and clean way to visualize the magnetic fields of permanent magnets. The demonstrator consists of a transparent acrylic case that holds iron filings in a fluid of proper viscosity. The filler hole is permanently sealed to prevent leakage. The unit can be viewed directly and can also be placed on a document camera or overhead projector for classroom demonstration. The demonstrator is used with user-supplied magnets in various shapes and combinations.

Background

A permanent magnet is a piece of a special metal or other special material that can attract and pick up small ferrous objects. Permanent magnets can also make these objects into temporary magnets. However, the magnetism of a temporary magnet, such as the iron filings in the demonstrator, will disappear after the permanent magnet is removed.

Every magnet has two ends, a North Pole and a South Pole. The North Poles of two magnets will repel each other (push each other apart). However, the North Pole of a magnet will always attract the South Pole of another magnet. Since a magnet can exert a force on an object without being contact with it, we say it produces a magnetic field. Magnetic fields cannot be seen, but they can be detected by observing their effect on magnetic materials. We will use the magnetic field demonstrator to reveal the magnetic fields produced by various combinations of magnets.

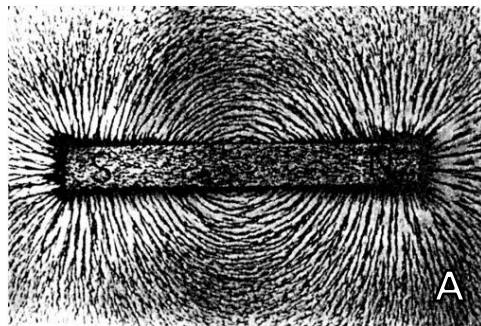
Maintenance

Handle the demonstrator with care. Avoid dropping it or contact with sharp objects that could scratch the acrylic case. Clean the case with a soft damp cloth and wipe dry. Do not use aggressive cleaners or solvents, as these can damage the surface of the case. Remove the magnets from the unit after each experiment. Do not store the demonstrator near magnets to avoid the iron filings becoming permanently magnetized. Store the unit in a dry, cool place, away from sunlight.

Activities

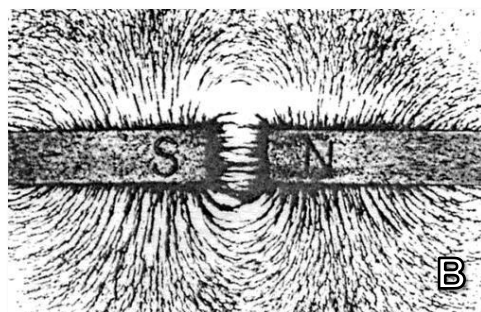
1. Magnetic Field of a Bar Magnet

Hold the magnetic field demonstrator horizontally and shake it until the iron filings are distributed evenly over the whole area. Choose a bar magnet that is small enough to leave a clear space on all round it on the demonstrator and place it centrally on the demonstrator. You can also place the demonstrator on top of the magnet. The iron filings will move under the magnetic force. A (right) shows a pattern produced by a bar magnet. If the effect is not obvious enough, gently tap the demonstrator to help the filings move into place.



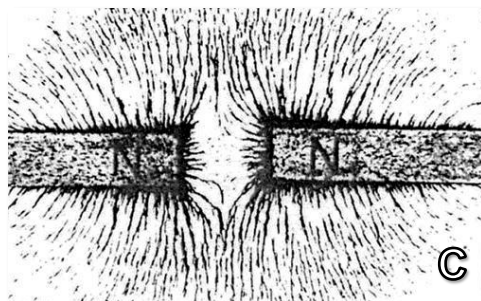
2. Magnetic Field Between Opposite Poles

Hold the magnetic field demonstrator horizontally and shake it until the iron filings are distributed evenly over the whole area. Place two bar magnets on or under the demonstrator with a north pole facing a south pole as shown in B (right). The iron filings will move under the magnetic force to reveal the field pattern. If the effect is not obvious enough, gently tap the demonstrator to help the filings move into place.



3. Magnetic Field Between Like Poles

Hold the magnetic field demonstrator horizontally and shake it until the iron filings are distributed evenly over the whole area. Place two bar magnets on or under the demonstrator with two north poles facing each other as shown in C (right). The iron filings will move under the magnetic force to reveal the field pattern. If the effect is not obvious enough, gently tap the demonstrator to help the filings move into place.



Related Products

Magnetic Color Chips (P8-1115) Multi-colored plastic-coated iron chips are not only easy to handle and clean up, but also heaps of fun! This alternative to iron filings puts some color and excitement into the exploration of 3-dimensional magnetic fields.

3D Magnetic Field Observation Box (P8-1180) This self-contained device reveals the proper, three-dimensional nature of magnetic lines of force. The sealed acrylic box contains iron filings suspended in a silicone oil solution.

Iron Filings (GI-0210-1) Observe magnetic field lines with economical iron filings. 500g jar.

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