

Activity 1 - Permanent Bar Magnets

TEACHER'S GUIDE

Although magnets are familiar household items, students may need to be reminded of the basic properties of magnets and magnetism. This hands-on activity allows students to re-acquaint themselves with magnets, magnetic fields and the concept of polarity, which form the basic ingredients of a study of Earth's magnetic field and the technology of magnetometers.

GOALS

1. Students will learn the basic properties of magnets and magnetic forces.
2. Students will learn about polarity, attraction, repulsion, and magnetic field strength, which are the basic terms and concepts we will be using throughout the THEMIS program.

MATERIALS

- A set of bar magnets, two per student. If there aren't enough magnets to go around, divide the class into small groups, with one magnet per group.
- 10 paper clips per student.

PROCEDURE

There are many different versions of this activity available on the Internet and you can find some locations provided at the end of this teacher guide. Please consult these sites for suggestions on detailed set-up and specific tasks the students can perform. Below is a shortened strategy that will quickly demonstrate the basic phenomena with which we will be working in THEMIS.

1. Distribute the magnets to the students.
2. Have them experience, tactilely, the repulsive and attractive natures of magnetic forces. Also, have them experience, through magnet manipulation and working with paper clips, the idea that magnetic forces vary in intensity throughout space, becoming weaker as distances increase.
3. Ask one student in the classroom to mark the letter 'N' on one end of a bar magnet. Use this arbitrarily-defined 'North polarity' to determine the N and S polarities of all other magnets in the classroom using the 'likes repel' and 'opposites attract' rule for magnetic polarity.

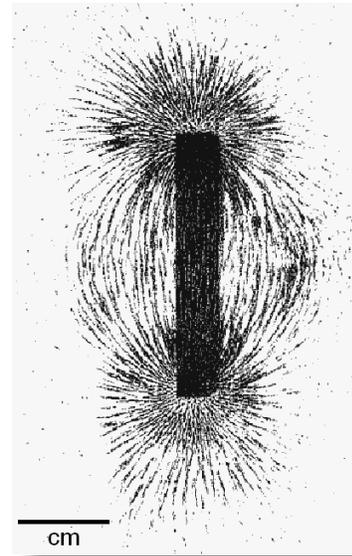
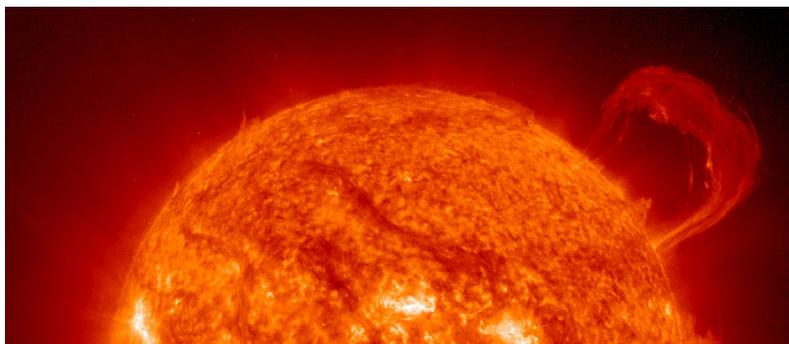
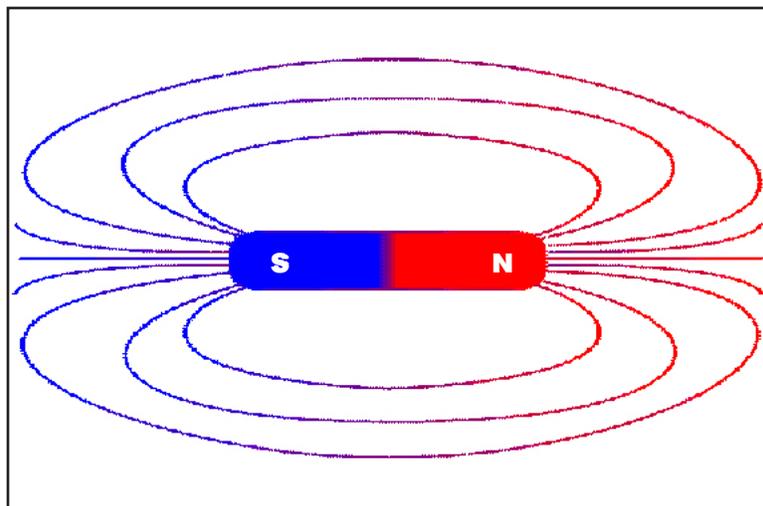
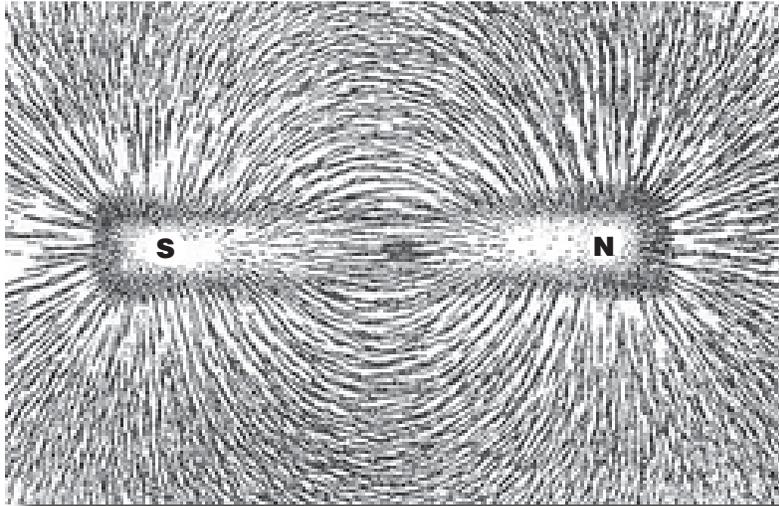


Figure A – The magnetic lines of force surrounding a bar magnet revealed by iron filings.

Magnetic field surrounding a bar magnet



What structural similarities do you see between the magnetic field lines surrounding the bar magnets, and those seen on the Sun?

VOCABULARY WORDS

Polarity – A property of magnets or electrically-charged objects in which there are two possible conditions (north and south for magnets, positive and negative for electrical charges) that describe an important characteristic of the forces that they experience. **Note to teachers: A common misconception is that magnetic poles are “positive” and “negative.” This is the wrong terminology and often confuses students into thinking that electrical charges and magnetic charges are the same things.**

Attraction – A condition where objects move or are pulled together under the influence of a force.

Repulsion – A condition where objects move or are pulled apart under the influence of a force.

Field – An influence (such as a force) that some forms of matter produce, which extends throughout the space that surrounds them.

RELATED WEB ACTIVITIES

1 – Exploring Magnetism guide

<http://cse.ssl.berkeley.edu/exploringmagnetism>

2 – Student Observation Network magnetism activity

http://son.nasa.gov/tass/pdf/Mapping_Magnetic_Influence.pdf

3 – IMAGE Playing With Magnetism activity

<http://image.gsfc.nasa.gov/poetry/activity/l1.htm>

4 – Exploring Magnetic Fields (IMAGE)

<http://image.gsfc.nasa.gov/poetry/activity/l2.html>