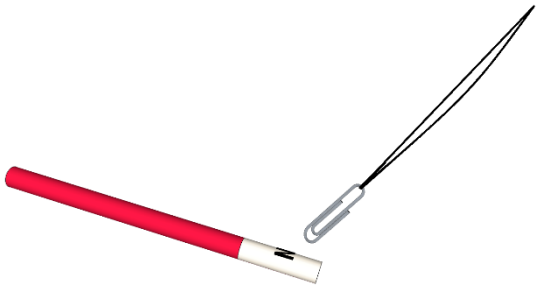
MINI MAGNET WANDS

Explore magnets and magnetism



Curriculum topics:

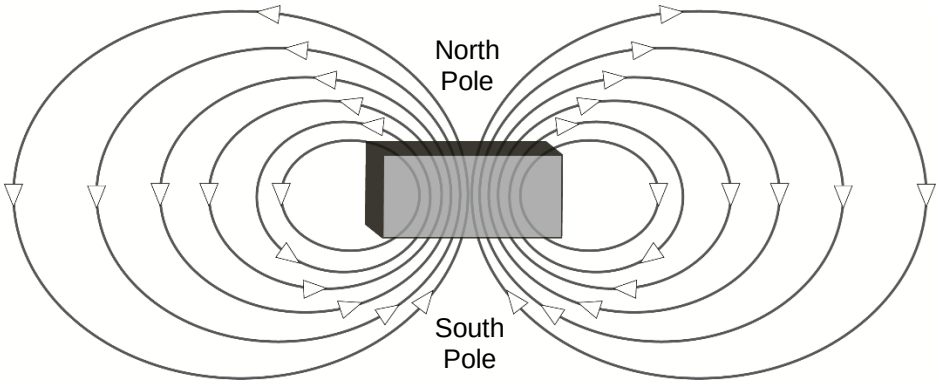
- Magnets and magnetism
- Properties of Materials
- Atoms and Molecules
- Geographic vs. Magnetic Poles
- Composition of Magnetic Materials

Subject:

Physical Science, Earth/Space Science

Grade range: 2 – 12

Magnetism is a fascinating phenomenon for students. This simple yet effective activity provides a practical method for teaching students how to find and label the magnetic poles on a magnet, identify magnetic materials, and understand the difference between geographic and magnetic poles. Mini Magnet Wands can also be used to understand compasses.



Who we are:

Resource Area for Teaching (RAFT) helps educators transform the learning experience by inspiring joy through hands-on learning.

For more ideas visit
https://raft.net/resources-2/

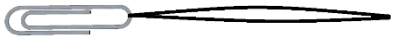
Materials required

- Plastic straw, jumbo (x1)
- Magnet (x1)
- Plastic straw, narrow (x1)
- Thread, 12” long (x1)
- Paperclip, regular (x1)
- Adhesive label, pre-printed w/ “N” & “S” (x1)
- Stick (x1)
- Magnetic and non-magnetic items, not included
- Optional: Directional compass

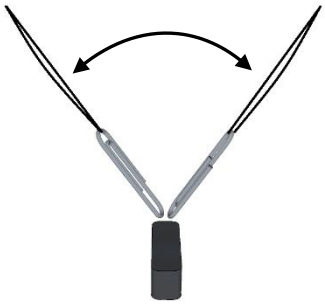
WARNING: Swallowed magnets can stick together across intestines causing serious infections and death. Seek immediate medical attention if swallowed or inhaled!

Finding the poles on the magnet

1. Insert thread through the paperclip and tie in a loop (below).



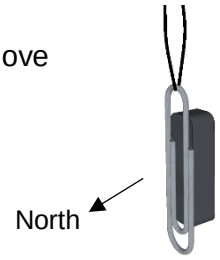
Paperclip attracted to pole from different angles



2. Hold the thread loop and move the paperclip over the magnet. Turn the magnet and repeat. The two sides that most strongly attract the paperclip are the **poles** of the magnet.

3. Put the paperclip flat against one of the poles. Suspend the magnet by holding the end of the thread loop. Let the magnet stop pivoting and face one direction. If the paperclip is facing north it is on the north pole of the magnet. If not, the paperclip is on the magnet’s south pole.

4. Put the paperclip on the north pole of the magnet. Hold the thread loop up again and move around. Does the north pole of the magnet always point north?



Set-Up

1. Wrap the adhesive label around the end of the jumbo straw. Carefully push the magnet **part way** into the jumbo straw (see below right). Make sure the magnet’s north pole aligns with the N.

2. If the magnet fits loosely in the jumbo straw, use the narrow straw as a wedge (see above left)

3. Place the paperclip over the N on the jumbo straw (see right). Suspend the magnet by holding the thread loop and check that N faces north. If N faces north, then fully insert the magnet. If N does not face north, then use the applicator stick to push the magnet out of the jumbo straw. Align the correct pole with the N and reinsert the magnet part way. Suspend the magnet again, realign as needed, then fully insert the magnet into the jumbo straw.

Content Standards:

NGSS

Properties of materials:
2-PS1-1
2-PS1-2
5-PS1-3

Forces & Interactions:
3-PS2-3
MS-PS2-5

Magnetic Forces
3-PS2-4
MS-PS2-3

To do and notice

1 Bring the **opposite** poles (**N-S** and **S-N**) and then the **like** (same) poles (**N-N** and **S-S**) near each other. Refer to the attracting and repelling forces being experienced. Note that each force increases as the distance between the magnets decreases.

2 Predict, and then test, which items from a group of magnetic and nonmagnetic items will or will not be attracted (not stick!) to a magnet.

3 Use the magnet wand to move, without touching, an item containing magnetic material.

The science behind the activity

We commonly label materials as being **non-magnetic, magnetic,** or a **magnet**. All matter really is magnetic, even if only at the atomic or sub-atomic level. Since most elements are only very, very weakly magnetic at best, we consider them to be non-magnetic. Iron, nickel, cobalt, and many of the alloys made from them, such as the iron alloy we call steel, are magnetic. Making a magnet requires bring a magnet near magnetic material. Electromagnets are used to create permanent magnets.

Each magnet has areas called “poles,” with one being labeled the north pole and the other the south pole. These poles are usually on opposite sides or ends of the magnet. Like (same) poles (north/north or south/south) of two magnets will repel each other while the opposite poles (north/south and south/north) will attract each other. The attractive and repelling force increases as the magnets are closer together. Is a magnet’s north pole attracted to a north pole of the Earth? No! The Earth’s North Pole is a geographic North Pole. Even though maps will list, correctly, a magnetic north pole in the North Polar Region the term “north” is a geographic designation. The Earth’s magnetic field has the equivalent of the south pole of a huge magnet in the area of the geographic North Pole and the north pole of the same magnet in South Polar Region. The north pole of a compass needle is thus being attracted to the south pole of the magnetic field of the Earth.

Learn more

- Use the magnet wand to magnetize other objects
- Design a magnetic scavenger hunt game with items around the house
- Make a mobile with metal hoop and use the magnet wand to hang items

Visit https://raft.net/resources-2/ to view the following related activities!

Floating Compass
Magnetic Explorer
Magnetic Field Line Viewer
Magnetic Maze

Resources

- YouTube video (8:06), Science of magnets - https://bit.ly/2JfYua1
- YouTube video (3:16), Earth’s magnetic field - https://bit.ly/2JgNrNO