

Mapping Magnetic Fields Activity

Students will work in groups of two.

Each group is provided with:

1. Two bar magnets
2. At least one navigational compass
3. Paper and pencil
4. Computer and internet access

Pose the question: Why is the magnetic force different in different areas around the magnet?

Prior to the student investigation, consider showing a demonstration of field around a magnet using some form of a magnetic field demonstrator. Also, some description of how a compass needle lines up with the magnetic field—that the field direction is the direction of force acting on a north pole, and why that produces rotation until the needle is aligned.

Optional Activity

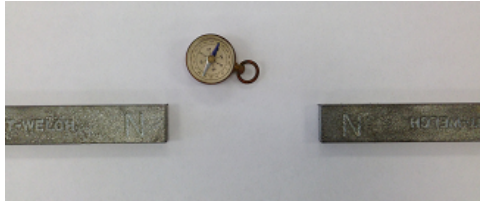
Use an overhead projector or a document camera to display this demo for students. Put iron filing inside a ziplock bag and spread them evenly. Place a bar magnet on top of the bag of iron filing. Have students observe and record the distribution of the iron filings.



Part One—the field around a single bar magnet.

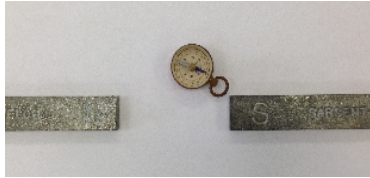
1. Students will place a single bar magnet on the center of a sheet of paper.
2. The compass is placed on the page adjacent to the magnet (anywhere). Students note the orientation of the needle, remove the compass and draw an arrow on the paper at the compass location indicating the needle orientation.
3. Move the compass to a new location and repeat step 2.
4. Repeat step 3 until enough arrows surround the bar magnet to sufficiently illustrate the shape of the field.

- a. Note: instructor will need to monitor student progress to determine if sufficient compass positions have been plotted to allow students to create an appropriate field map.



Part Two—the field between two north poles.

1. Students will place two north poles facing each other on a sheet of paper. The poles should be far enough apart so the compass can be easily placed in multiple positions between them.
2. Repeat procedure in Part One to map the field between two north poles.



Part Three—the field between a north and a south pole.

1. Students will place a north pole facing a south pole on a sheet of paper. The poles should be far enough apart so the compass can be easily placed in multiple positions between them.
2. Repeat procedure in Part Two to map the field between two these poles.

***Part Four (Optional) —the earth's magnetic field.**

1. Open the Phet simulation on magnetic fields.
 - a. <https://phet.colorado.edu/en/simulation/legacy/magnet-and-compass>
2. Click the Show planet Earth box on the right.
3. Note the polarity of the large magnet inside the planet. Which end is in Canada?
4. Move the compass into Alaska. Which way does the “north” needle point? Why doesn't it point north?
5. What is the relationship between the geographic North Pole and the magnetic north pole?

*This program must be downloaded onto your computer

