Magnetic Fields All Around

Magnetic fields are invisible, but all around us!
Use a compass to find them!

Experiment with the compass away from the objects on the table first.
Which way did the needle point? _____

The needle was attracted to (circle one):

Your teammate's "magnetic" personality You Earth's magnetic pole

Experiment with the compass near a magnet.
What did the compass do? (circle one):

It was pulled toward the magnet It made a low noise

The compass vibrated Its needle moved

Its needle vibrated It made a high noise

Experiment with the compass and the other objects on the table.
Which objects had no affect on the compass?

List and describe those objects that affected the compass like the magnet did in the table on the next page.

Note your observations in the table below:

These objects affect the compass like the magnet does (write their names):	The objects were made of (write a description):

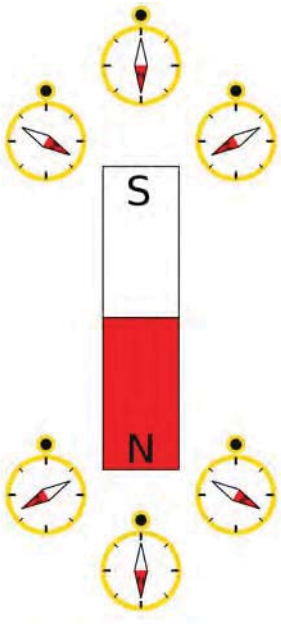
Form a hypothesis: What type of objects make the compass move? In other words, which objects generate a magnetic field? Did it matter whether the object moved or was still? Did it matter what the objects were made of?

I think that

Share your hypothesis with the other members of your team, and discuss whether the various ideas seem reasonable.

Mapping Magnetic Field Lines

Magnetic fields are invisible, but with the aid of a compass you will trace magnetic field lines!



1. Place a bar magnet on this sheet, in the box.
2. Draw a dot somewhere near the magnet (below the line), and place the center of a compass on the dot.
3. Observe the direction of the compass arrowhead. Draw a dot where the arrow is pointing.
4. Move the compass center to this new dot, and again draw a dot at the location of the compass needle.
5. Remove the compass and connect the dots with arrows indicating the direction that the compass points.
6. Continue steps 3–5 until the line meets the magnet or the edge of the paper.
7. Pick another spot near the magnet and repeat the process, starting with step 2.

Place magnet here

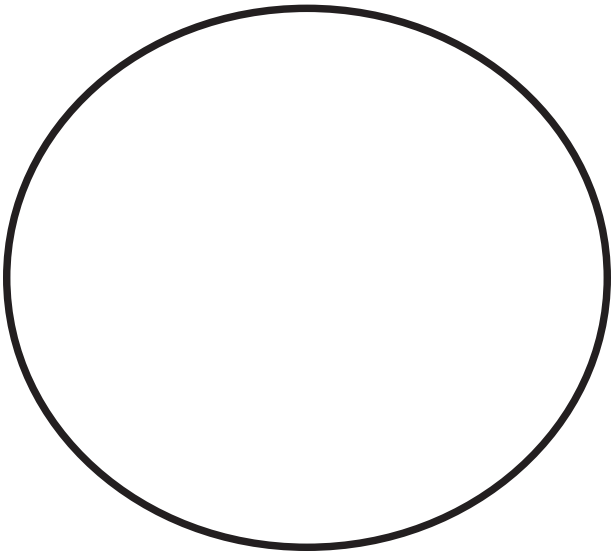
Modeling Neato-Magneto Planets

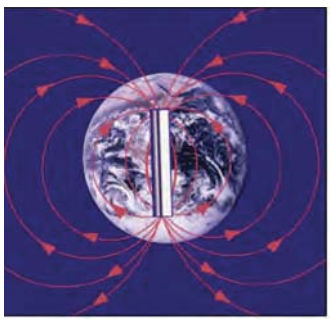
Jupiter and Earth are surrounded by magnetic fields.
Create your own miniature, 3-D versions!

The ball represents a planet with magnetic fields. It has a magnet inside, which generates a magnetic field.

Trace planetary magnetic fields! Sprinkle some "clamped" staples onto a ball. If you'd like, you can move the staples so they form chains, running between the poles (but don't wind them around the planet).

Imagine what Jupiter's magnetic field lines look like in three dimensions. Draw a picture of it below.





Does a real planet have a gigantic magnet inside?

Not really. Flowing metallic material deep within Earth and Jupiter give the planets MAGNETIC PERSONALITIES!

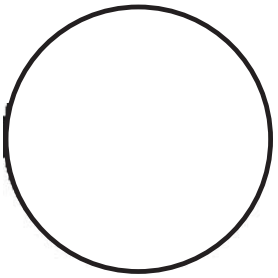
Polar Halos

Compasses aren't the only way to find magnetic fields.
Check out colors and sounds — transformed from radio waves for us to hear — produced by Jupiter's magnetic field.

Energetic particles, trapped in Jupiter's magnetic field, are slammed into Jupiter's upper atmosphere. Gases in the atmosphere glow as northern or southern lights, or aurora. **Draw what these polar halos look like on Jupiter and Earth:**

Jupiter

Earth



The energetic particles also give off radio signals. Just like your radio at home, spacecraft can turn these radio signals into sounds like this audio. **Describe the sounds:**