



# Snippets of Science from Fermilab

PS1A (3-8) Elaborate

## MAGNETIC FIELD LINES

**Challenge:** What is a magnet? How do we know things are magnetic?

**Goal:** Test a variety of materials to determine what types of materials are attracted to magnets and answer the question, what makes something magnetic?

**Fermilab Connection:** Fermilab scientists use huge, superconducting electromagnets to bend and focus the beam of particles in the accelerator complex. These magnets are an important tool used by scientists to study objects too small to be seen.

### Preparation

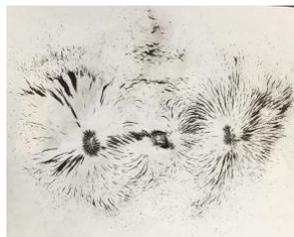
This investigation is split into two parts. One, determining what makes an object magnetic, and two, determining what makes an object a magnet and examining magnetic field lines.

#### Procedure: Part 1

1. Have a variety of magnets and the materials set out to investigate which materials are magnetic and which are not.
2. Complete the data table as you perform the different tests. Make sure you make a prediction first!
3. Compare and contrast the objects that are magnetic versus those that are not. What makes something magnetic?
4. Check your work [here!](#)

#### Procedure: Part 2

1. What makes something magnetic? Magnets create magnetic field lines. We cannot see them, but we can detect them using iron filings.
2. Place the iron filings in a Ziploc bag and seal the bag. Put the bag on a white paper plate and shake it around so the filings are evenly distributed across the plate's surface.
3. Place the paper plate and Ziploc bag of filings on top of a magnet. Move the bag around until you can see the pattern of the magnetic field lines like the picture below.



4. Sketch your magnetic field lines on data sheet 2 and answer the questions.

### GRADE LEVEL

Grades 3–8 with modifications

### MATERIALS

- Variety of magnets
- Aluminum foil
- Steel nail
- Paper clip
- Variety of coins
- Iron filings
- Ziploc bag for iron filings
- Paper plate

### Fermilab Resources:

Click on the linked resources!

[Main Injector Virtual Tour](#)

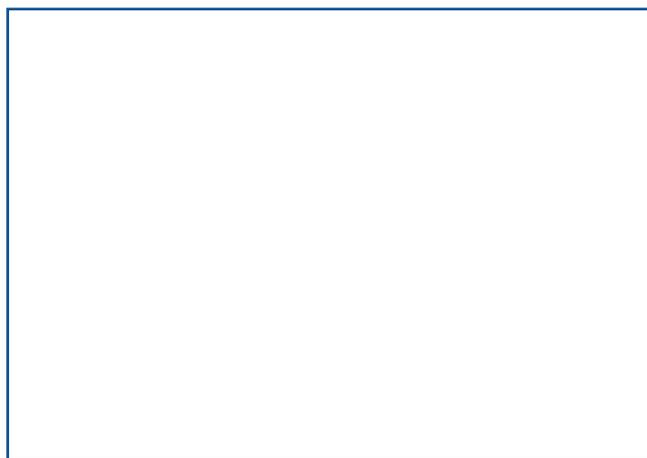
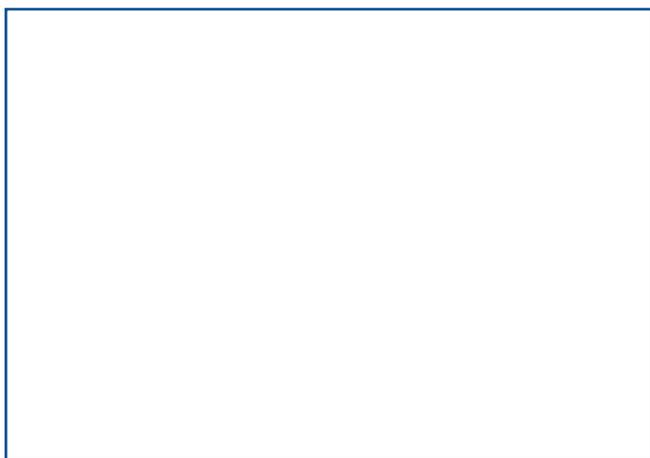
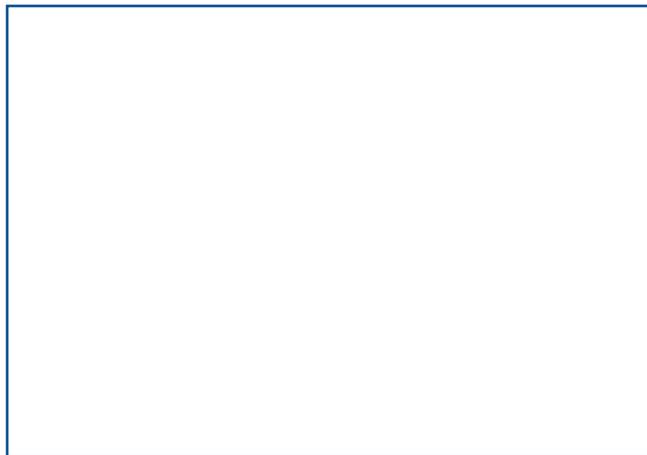
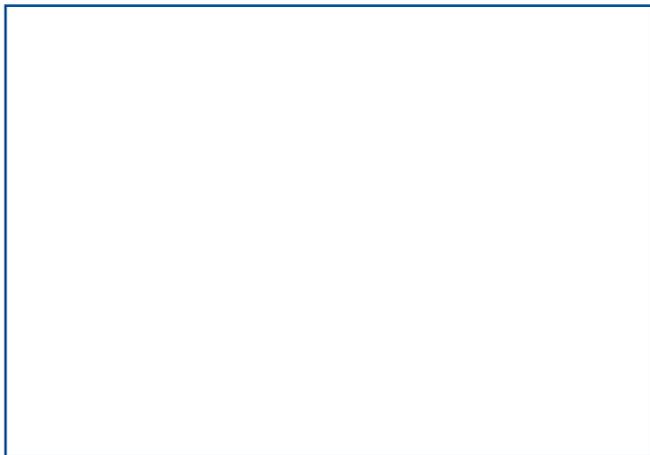
Part 1 Data Sheet: Is it Magnetic?

Item or Items	Prediction: Magnetic? (Write Yes or No.)	Results: Magnetic? (Write Yes or No.)
Aluminum foil		
Steel nail		
Paper clip		
Coins (Add a Canadian coin to the mix if you have one.)		
Plastic		
Washer		
Others:		

Compare and contrast which objects are magnetic and which objects are not. What properties are similar and what properties are different? What conclusions can you draw based on the evidence you collected?

## Part 2 Data Sheet: Magnetic Field Lines

Sketch four different sets of magnetic field lines in the spaces below:



Do some research. What makes an object a magnet?

What properties must a magnet have?

Give some examples of different types of magnets and their uses. Include at least one example from Fermilab!