

# Exploring Magnets: Part 1

## INTRODUCTION

In this activity you will work with a partner to explore magnets.

### Materials:

- Paper clips
- Several different Magnets
- Various magnetic and nonmagnetic objects

1. What items do you think will be attracted to the magnets? What items do you think will not be attracted to the magnets? Why do you think so? After you have made your **predictions** below go ahead and test them.
  
  
  
  
  
  
  
  
  
  
2. What do you notice when the two magnets are placed next to each other? Do they attract or repel? Does it depend on the position of the magnet? Explain.
  
  
  
  
  
  
  
  
  
  
3. Find at least two ways to make the paperclip move with the magnet. Do this without the paperclip coming in direct contact with the magnet. Explain what you did below.
  
  
  
  
  
  
  
  
  
  
4. Can you identify which side of the magnets has the same poles? What evidence are you using to support your claim about which sides are the same?

# Exploring Magnets: Part 2

## INTRODUCTION

In this activity you will work with a partner to each construct a “Fuzzy Face” to explore magnetic fields.

### Materials:

- Zipper bags
- Cardboard or foamboard
- Teaspoon of iron filings
- Duct tape
- Several different Magnets
- Various magnetic and nonmagnetic objects

### Follow teacher instructions to build your “Fuzzy Face.”

5. With a little practice, you can get a thin layer of filings on top of the picture in your bag. The filings should not all be in a lump at one end. Draw what you see below.
  
6. Carefully lift the bag and set it on a paper clip. Do the filings move around? Describe what happens below.
  
7. Can you predict what will happen to the iron filings if you place a magnet on the table and set the bag down on top of the magnet? Write your prediction below.
  
8. Now place the magnet on the table. Then gently pick up the bag and place it on the magnet. What happens? Was your prediction correct? Draw what you see in the space below:
  
9. **Going Further:** Using some other magnets, you can see what kind of pattern they create. Be sure to try placing each magnet under the bag. Place two magnets under the bag. What does the pattern look like when the magnets are placed so that they are attracted to each other? What does the pattern look like when the magnets are placed so that they repel one another? Does the shape of the magnetic field change? Try it! Draw some of your findings on a sheet of paper.

# Exploring Magnets: Part 3

## INTRODUCTION

Around every magnet, there is an invisible field called a **magnetic field**. This field is what attracts items such as paper clips and nails to the magnet. Although it is invisible, we know that we can see the effects of this invisible field in the pattern that is made by iron filings when we expose them to a magnet. Now let's explore these fields some more.

### Materials:

- Several different Magnets
- Various magnetic and nonmagnetic objects

10. Lay your "Fuzzy Face" on a table and shake it gently back and forth until you get a thin layer of filings on top of the picture in your bag. The filings should not all be in a lump at one end.
11. Now put your other bar magnet under the zipper-lock bag. Does the magnetic field of this magnet look like the first one? Try some other bar magnets and compare with those of other teams of students. Draw what you discover below.

**Remember:** *We cannot really see the magnetic field, but we can see how it moves the iron filings around. This is like the wind outside. We cannot see the wind, but we can see how it moves the leaves on the trees or paper in the street.*

12. Why do you think the iron filings line up along the magnetic field as they do?

13. Now, put your two bar magnets end-to-end so that they are **attracted** to each other and then put your zipper-lock bag on top. What do the magnetic fields of the two magnets look like now? Draw a picture of what you see below.

14. Next, put your two magnets end-to-end so that they **repel** each other. Set your zipper-lock bag on top and see if the fields look different. Draw a picture on your data sheet of what you see.

15. Look at your pictures. Can one magnetic field change the shape of another magnetic field when they get close to each other? What do your drawings show you about this?
  
16. Now try exploring the fields of several other magnets of a different shapes. These magnets might be shaped like a donut or a horseshoe. Try to see what the magnetic field looks like around these magnets. Draw pictures of them below. Do all magnetic fields look alike? Do they change shape with the shape of the magnet?
  
17. Explore the magnets with each other and other object around the room. Try placing objects between the magnets and magnetic objects; this is called **magnetic shielding**. Do objects made of different substances block/weaken magnetic fields more than others? Draw and explain your findings below.

Teacher Key:

Could you see the magnetic field? (No, the magnetic field is invisible. What was observed was the pattern made by the field.)

Were the field lines the same for each type of magnet? (The field lines you see will be different when you use different magnets.)

Where does the field seem to be the strongest? (Magnets have two poles; the field lines spread out from the north pole and circle back around to the south pole. Iron filings line up along the lines of magnetic force. The field is strongest at the poles; this is where the iron filings tend to be the most concentrated.)

How was this activity similar to that in Part 1? How was it different? What more did you learn?

Further research to take notes on?:

<http://www.phy6.org/Education/wmfield.html>

<http://sciencenetlinks.com/lessons/exploring-magnetic-fields/>

<http://web.csulb.edu/~lhenriqu/Magnets.pdf>

Magnetic Shielding:

<https://www.exploratorium.edu/snacks/magnetic-shielding>