



**Teacher Version**

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## Magnetism

**The following California State Science Standards are relevant to this Pathway:**

Grade	Topic	Subsection
4	Physical Science	1.f
	Investigation and Experimentation	6.c, f
5	Physical Science	1.c, f
	Investigation and Experimentation	6.b

[California State Standards](#)

### Introduction:

On this Pathway, you'll see many different kinds of magnets: iron-bar magnets, small grains of black sand that act like tiny magnets and electromagnets that are created by a current of electricity.

There's something almost magical about a magnet. A magnet creates a magnetic field that pushes and pulls through thin air, acting with a strong invisible power. Though magnetic fields are invisible, you can see their effect on iron filings, compass needles, and other magnets.

If you have any questions or problems, ask an orange-jacketed Explainer for help.

**Directions:**

- Find the exhibit.
- Read the instructions.
- Play with the exhibit.
- Answer the questions below.

Can't find an exhibit or have a question? Ask an explainer.



Exhibit Title	Done?
<a href="#">Black Sand</a>	
<a href="#">Visible Magnetic Domains</a>	
<a href="#">Magnetic Spinner</a>	
<a href="#">Magnetic Clouds</a>	
<a href="#">Magnetic Tightrope</a>	
<a href="#">Floating in Copper</a>	

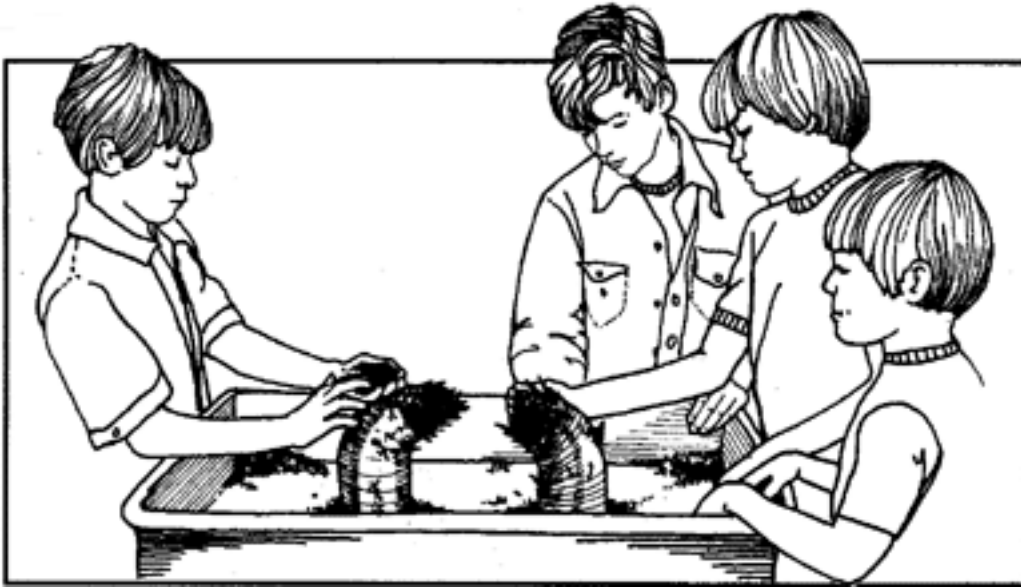
**Black Sand**

Related Material:

[Associated Snack](#)

[Exhibit Information](#)

1. Take a close look at the sand. Describe which parts are attracted to the magnet? **Only the dark black specks stick to the magnet. (These specks are small pieces of iron naturally found in some sands.)**
2. Put this sheet of paper on top of the magnet and sprinkle some black sand on it. Move the paper to different parts of the magnet. Describe the pattern you see. **The black sand sticks together in spikes about one half inch long. The spikes always point towards and away from the north and south ends of the magnet no matter where the paper is moved.**
3. Put your hand on the magnet and sprinkle sand on your hand. Does the magnetic field pass through your hand? **Yes**



## Visible Magnetic Domains

Related Material  
[Exhibit Information](#)

Look at the disk through the microscope and notice the maze of tiny lines. These lines are tiny magnetized areas called domains. The dark lines have their north poles facing up, and the bright lines have their north poles facing down.



Bring the bar magnet near the disk. The south pole of the magnet pulls up on the north end of the domains, making the disk turn dark.

What does the other pole of the magnet do to the disk?

**The disk turns lighter.**

## Magnetic Spinner

Related Material:

[Video: Magnetic Spinner](#)

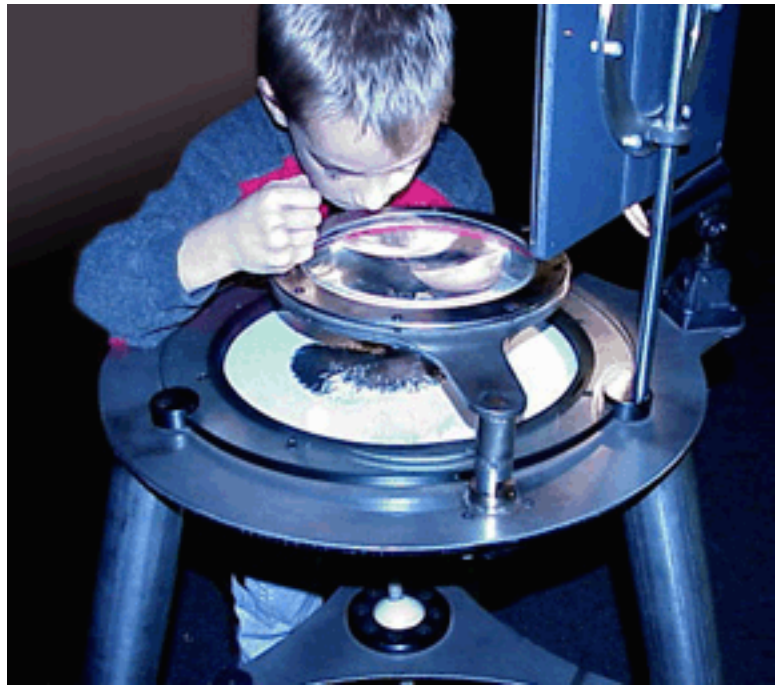
Hold the spinner with the magnets under the table and spin the spinner.

1. How do the metal filings move—the same direction as your spin or the opposite direction?

**They move the opposite direction.**

2. How do they move? Do they slide around? Jump? Tumble end over end?

**They seem to flip end over end. Sometimes they slide around.**



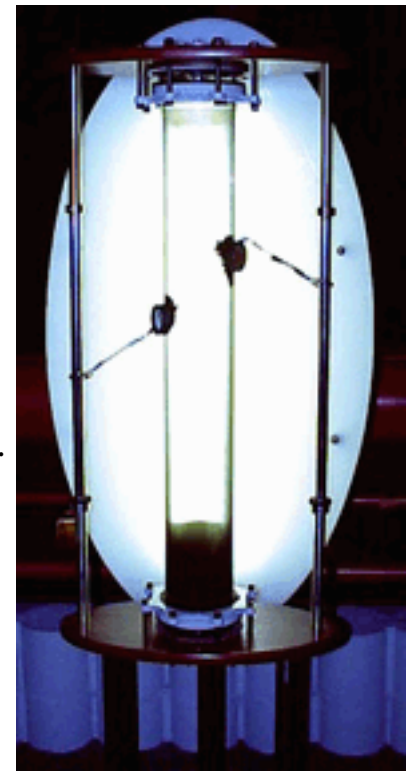
## Magnetic Clouds

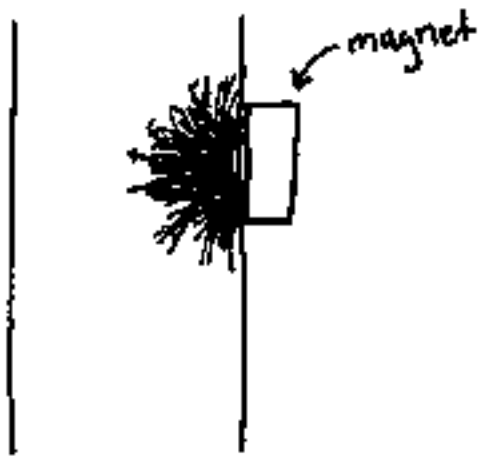
Related Material:

[Video: Magnetic Clouds](#)

1. After you drag some black sand up from the bottom, let it go and then quickly bring the magnet down the tube to catch sand particles as they fall past.

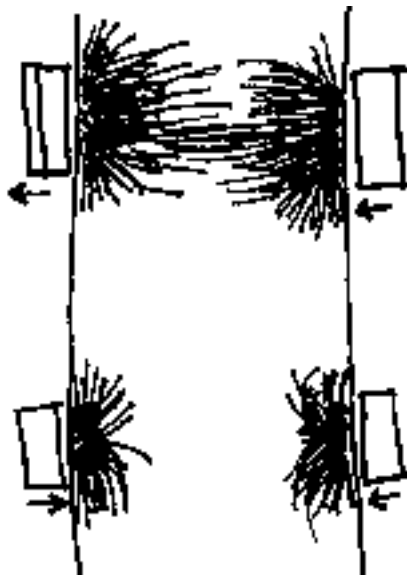
Draw what it looks like as the magnet catches the particles.





2. Now try this with both magnets.

Draw what it looks like as both magnets catch the particles.



The appearance of the caught particles will change depending on the direction of the magnets. If the two north poles are pointing the same way, the particles will try to bridge the span between both magnets. If like poles are pointing towards each other, the particles from each side will repel each other.

3. How can you get one of the magnets to stick to the upper part of the tube without slipping down?

**If you bring a lot of black particles up and let them be attracted to the magnet, the magnet will stay in place.**

## Magnetic Tightrope

Related Material:

[Exhibit Information](#)



1. Which object is the easiest to move between the magnet? Why?

**The aluminum rod is the easiest to move between the magnets because it isn't attracted to the magnet.**

2. Is there any way to get the aluminum rod to stay stuck to one of the magnets? If you can do this, describe or draw how you did it.

**The only way I've found to get the aluminum rod to stay up is to trap it between three of the steel rods. However, the aluminum rod is still not attracted to the magnet.**

## Floating in Copper

1. Can you get the object between the copper bars to float? How?

**Yes. The magnet between the two copper bars will float if you carefully put the top magnet at just the right height but you constantly need to readjust where you place the top magnet.**

2. What's unusual about how the magnet between the copper pieces moves?

**The reaction time of the magnetic field seems to slow down.**

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