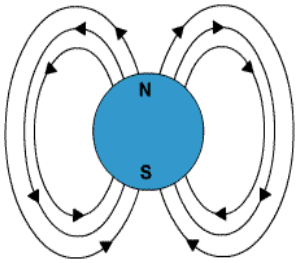
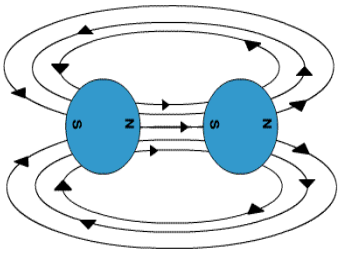
MAGNETISM

Magnetism is a force that acts at a distance and creates an invisible field called a **magnetic field**. A magnetic field strongly attracts special materials like iron, nickel, and cobalt. What a magnetic field actually consists of is somewhat of a mystery, but we do know it is a special property of space.



Magnetic Field

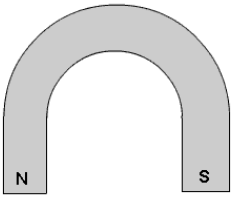


Force attracts N to S

Properties of magnets

A magnet is an object or material that attracts certain metals.

- Magnets attract certain metals, such as iron, nickel, and cobalt.
- A magnet can also attract or repel another magnet. When placed near each other, opposite poles attract and like poles repel each other.
- Magnets come in various shapes.



Here are the activities we'll do as we investigate Magnetism:

1. A Different Kind of Compass
2. The Dancing Cobra
3. Exploring Magnetism

The experiment kit contains:

1. Horseshoe Magnet
2. Adhesive Magnet (1 inch)
3. Popsickle stick
4. Cotton Thread (8 inches)
5. Modeling Clay
6. Lead Pencil with Eraser
7. Test Bag (Chips, Buttons, Paper clips, etc)

****You will also need a small bowl of water and a straight pin, these are not in your kit****

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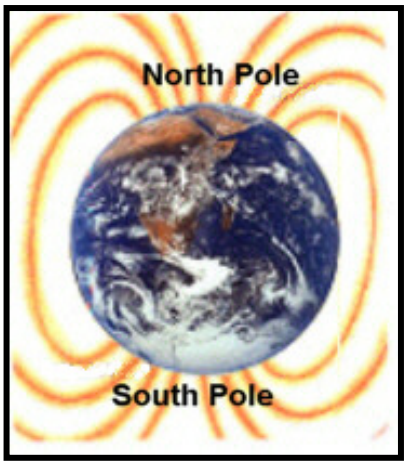
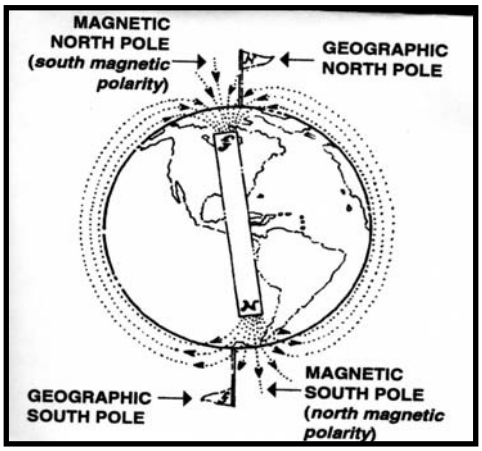
First Experiment: A Different Kind of Compass

In a compass, the side marked **(N)** will point toward the Earth's North magnetic pole. Thus, it is called the **"North-seeking pole."** The first true application of a magnet was the compass, which not only helps in navigation by pointing toward the North magnetic pole, but it is also useful in detecting small magnetic fields. A compass is simply a thin magnet or magnetized iron needle balanced on a pivot. The needle will rotate to point toward the opposite pole of a magnet. It can be very sensitive to small magnetic fields.

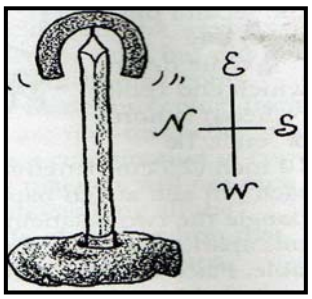




You Will Need:
Modeling Clay (for stand)
Sharp Pencil with an Eraser
Horseshoe Magnet

What to Do:

1. Find the plastic bag containing the clay, open the bag and remove the clay. Sharpen the pencil.
2. Roll the piece of clay into a ball and flatten it to make a sturdy stand.
3. Push the eraser end of the pencil into the clay stand.
4. Carefully balance the magnet on the pencil lead.



What Happens:
The magnet gradually positions itself into a north – south direction.

Why:
The earth is a magnetic ball with north and south magnetic poles. The magnet positioned itself in a north-south direction because magnetic metals and liquids buried within the earth's core have turned it into a giant magnet that naturally attracts all compasses and magnets. These great magnetic forces are concentrated at its north and south magnetic poles.

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Second Experiment: The Dancing Cobra

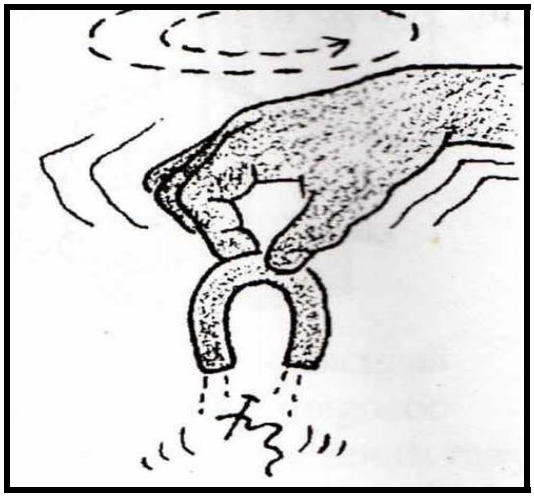
You Will Need:
Cotton Thread (8 inches)
Straight Pin
Horseshoe Magnet

What to Do:

1. Have an adult make a loop in the thread and tie it around the head of the pin.
2. Hold the end of the thread with the pin attached
3. With the other hand, lift it with the magnet
4. When you get the pin to an upright position, carefully lift the magnet from the pin so it is slightly suspended in midair.
5. Move the magnet slowly in circles and watch the pin and thread, or cobra, follow the movements.

What Happens:
The pin and thread float suspended in the air slightly below the magnet and follows its path as you move it around.

Why:
Gravity is the force that pulls everything downward toward the middle of our planet. The pin seems to be slightly overcoming gravity, floating below the magnet while not touching it. This is proof that the magnet's attraction can pass through air and, over a short distance, can "balance" the force of gravity.



Third Experiment: Exploring Magnetism

You will need:
Popsicle Stick
Adhesive Magnet
Magnetic Pickup Data Sheet
Test Materials Bag

What to Do:

1. Make your **prediction** (what you think will happen)
    - Place all your test materials on the table
    - Write the name of each item on your *Magnetic Pickup Data Sheet* in the ITEM - "What are we testing?" column.
    - Which ones do you think will be attracted to the magnet?
    - Make two piles. Place all the items you think **will** be attracted to the magnet in one pile. Place all the items you think **will not** be attracted to the magnet into another.
    - Write your **will** and **will not** predictions on the data sheet in the PREDICTION – "What will happen column?"

2. Test your prediction
    - Make a Magnet Wand
        i. remove adhesive backing from magnet
        ii. stick magnet on one end of the popsicle stick
    - Bring your magnet wand close to one of the items. What happens? Is the item attracted to the magnet? How can you tell?
    - Test each item by bringing your magnet close to it.
    - Do you see something special about all the items that are attracted to the magnet? How are they all the same? How are they different?
    - Record your RESULTS on the data sheet.

What Happens:
Some of the items you test will be attracted to the magnet and **will** stick to it, some of the items you test **will not** be attracted to the magnet.

Why:
We call items that are attracted to the magnet **MAGNETIC.** These items are always made of iron, steel, nickel or cobalt. All the items that **will** stick to the magnet are metals or they contain metals.

Neat Thing to Do:
Drop the metal items in a small bowl of water, use your horseshoe magnetic to see if it will pick them up in water. Do magnetic forces work in water?

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Magnetic Pickups Data Sheet

ITEM What are we testing?	PREDICTION What will happen?	Result What really did happen?

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Interested in learning more about MAGNETISM?

Check out the **following resources that provided information on this subject:**

1. **365 Simple Science Experiments, Churchill, Loesching, & Mandell, 1997.**
2. **Physical Science Resources :**

   http://www.school-for-champions.com/science/resources.htm

3. **Exploration of Magnetism : http://www-istp.gsfc.nasa.gov/Education/Imagnet.html**
4. SEE science and everyday experiences **: http://www.deltasee.org**

Science Club website:

www.discoveret.org/scienceclub

Come and see what our members have done!

Even though school is about to end for the year, we'd still like see the kid's results! Until school is out, we'll keep checking the science club cart at the library. If you would like to share some work over the summer, you can e-mail them to the science club (scienceclub@discoveret.org) or send them by regular mail to :

Science Club
American Nuclear Society, Oak Ridge/Knoxville section
P.O. Box 5075
Oak Ridge, TN 37831-5075

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NOTE TO PARENTS

Dear Parents-

This science club pack is designed for the basic education standards in physical science. The content will enhance your student's understanding of the properties of magnets, magnetic fields, and the properties of the objects magnets attract and repel.

Questions to ask your child as they do this activity may include:

- What is a magnet?
- Describe how you know if something is a magnet.
- How did you decide whether something was magnetic or not?
- Can you see magnetism?
- Can you feel magnetism?

For safety, please do all activities with your child and;

- Be sure that any materials you give to the younger children do not have sharp edges.
- Be sure students do not put objects in their mouths.

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Magnetism Questionnaire

1. Were the materials provided appropriate? Yes _____ No _____
Please explain._____

2. Did you have enough materials for each experiment? Yes_____ No_____

Please explain._____

3. Did the experiments work? Yes_____ No_____

If not, please explain_____

4. Please provide any suggestions for improvements or additional

experiments/explanations._____

_____

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Tangrams

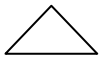
Here are the activities we'll do as we investigate Shapes using Tangrams:

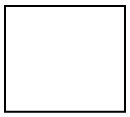
1. Tangram Exploration Chart
2. Tangram Puzzle

The activity kit contains:

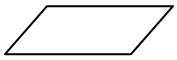
1. Tangram Cutouts
2. Tangram Shape Puzzle

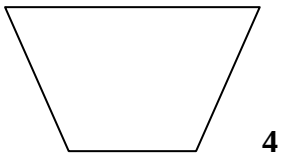
Tangrams help develop your understanding of shapes.

- **Triangle**  **3 equal sides**

  Square  **4 sides with all sides equal**

- **Rectangle** **4 sides with opposite sides equal**

- **Parallelogram**  **4 sides with one pair of sides slanted the same direction**

- **Trapezoid**  **4 sides**

What to Do:

1. **Use the seven Tangram cutouts to see how many cutout pieces it takes to make each shape listed on your Tangram activity sheet.**
2. **Mark your results on the Tangram Exploration Chart for each shape.**
3. **Answer these questions:**
   - **What did you discover about triangles?**
   - **What process did you use to figure out the shapes?**
   - **Are you able to make all the shapes?**

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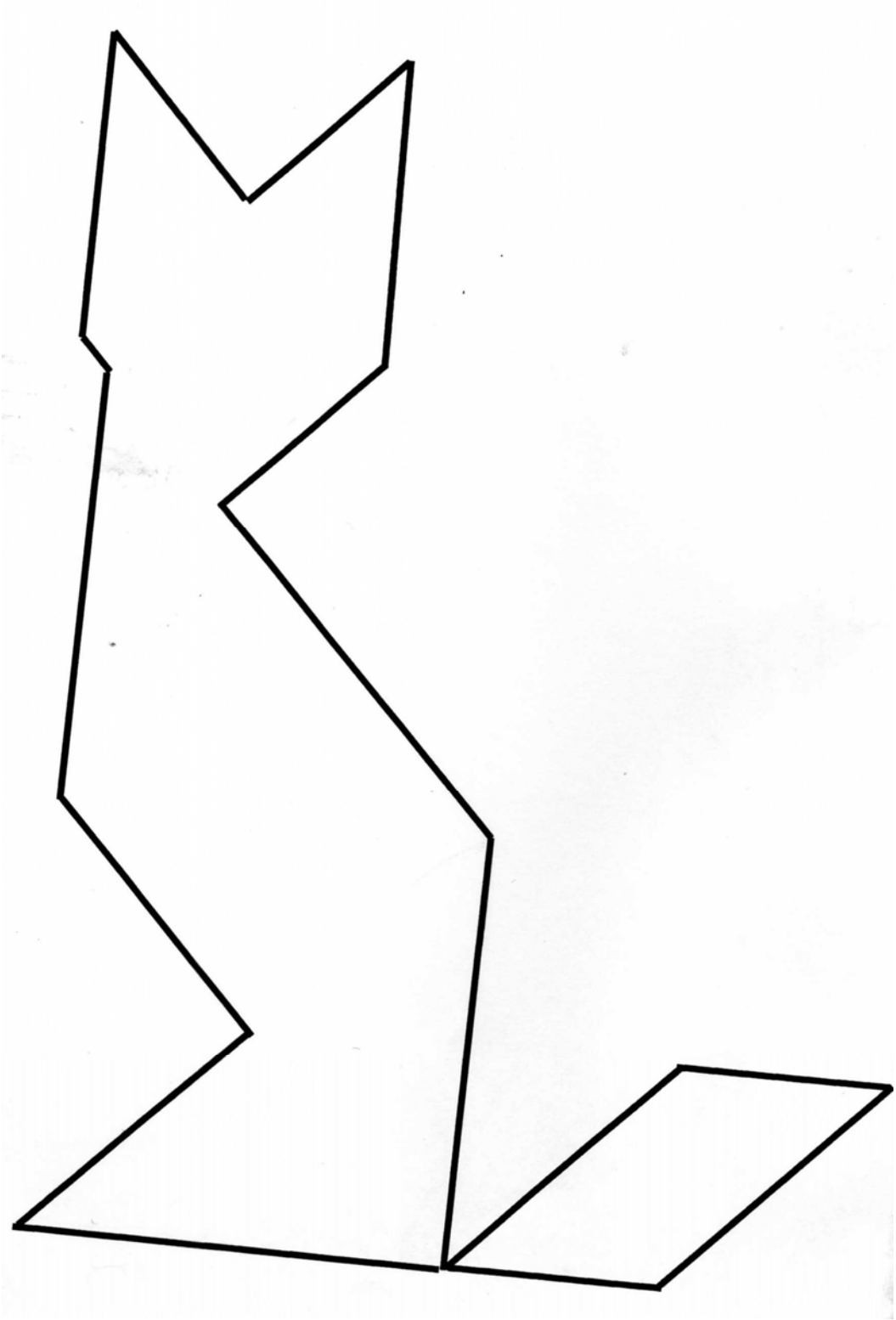
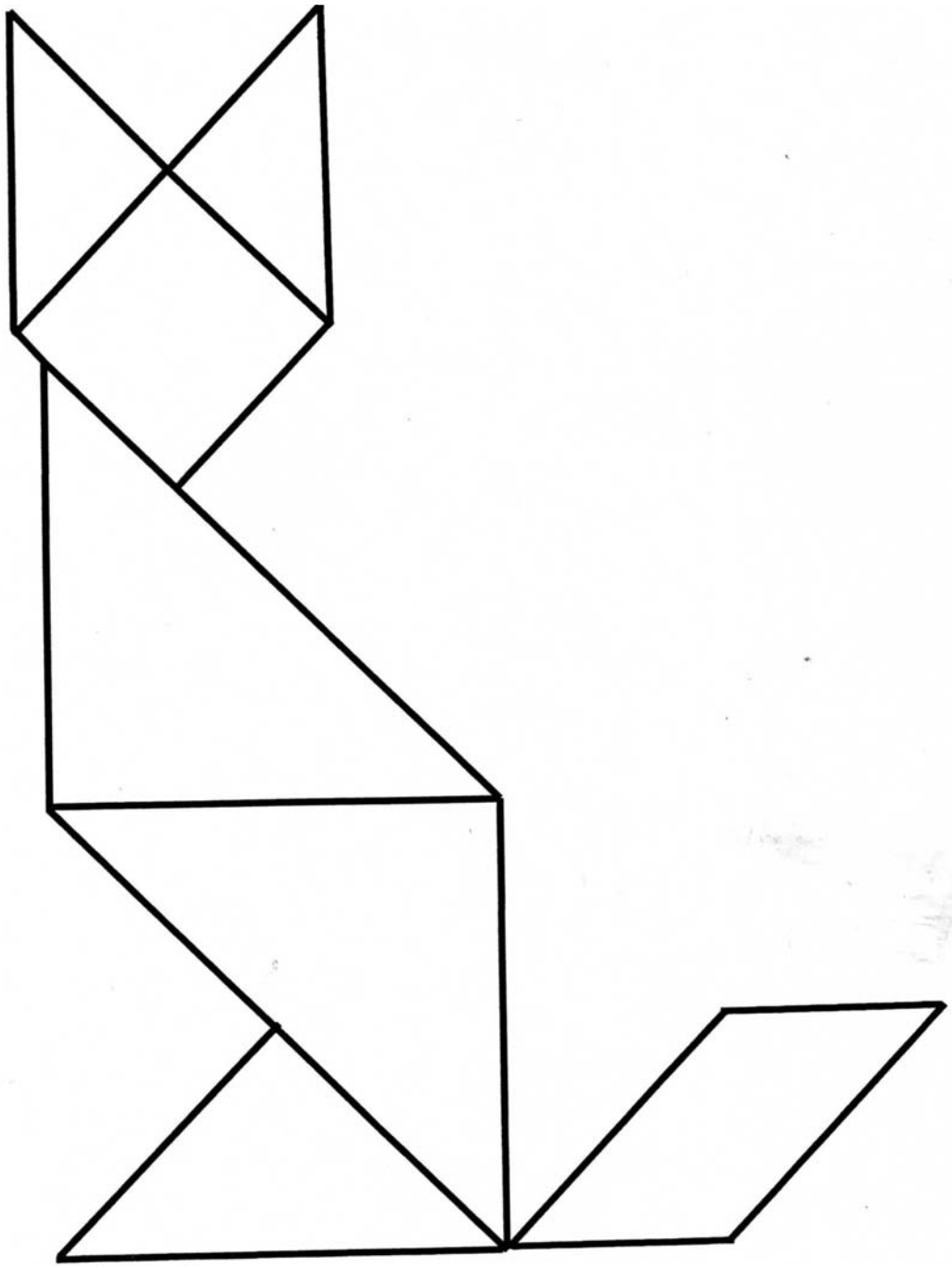
Complete the Tangram Chart by placing an X in the box for the numbers of pieces it takes for you to make each shape.

Tangram Exploration Chart					
Shapes to Make					
Number of Tangram Pieces	Triangle	Rectangle	Square	Parallelogram	Trapezoid
1					
2					
3					
4					
5					
6					
7					

BONUS:

Just for fun try to use your 7 cutouts to fill in the Tangram shape puzzle.



PUZZLE ANSWER KEY: