Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hour \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Magnetism Station 3: Mapping Magnetic Field Lines**

**Content Objective:** Students will explore magnetism and learn about their different poles, invisible magnetic fields, attraction and repulsion.

**Writing Language Objective:** Students will detect and draw a magnetic field using a compass.

**Essential Question: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Materials (pairs)**

-1 magnetic compass -2 Alnico bar magnets -6 sheets of white paper

-4-5 paper clips -iron filings

**Do not bring magnets near computers!!**

**Part 1-Pre-lab questions: Answer these questions using complete sentences with a restate. You may discuss these questions with your table groups**

1. What do you know about magnetism?

2. Is the Earth magnetic?

3. Is the Sun or other planets in our solar system magnetic?

4. How does a compass work?

**Part 2:** Raise your hand and ask Ms. Murphy in a British accent for the Mapping Magnetic Fields Materials. Explore your materials and answer the following questions using complete sentences with a restate.

|  |  |  |
| --- | --- | --- |
| 1. | http://cse.ssl.berkeley.edu/SegwayEd/lessons/exploring_magnetism/Exploring_Magnetism/Exploring_Magnetism_images/spacer_white_13x13.jpg | What do you notice about the interaction of the bar magnets you were given? |
| http://cse.ssl.berkeley.edu/SegwayEd/lessons/exploring_magnetism/Exploring_Magnetism/Exploring_Magnetism_images/spacer_white_13x13.jpg | | |
| 2. | http://cse.ssl.berkeley.edu/SegwayEd/lessons/exploring_magnetism/Exploring_Magnetism/Exploring_Magnetism_images/spacer_white_13x13.jpg | What materials interact with the magnets and how do they interact (coins, paperclips, string, screws?  **Interacts with magnets (you may list):**      **Does not interact with magnets( you may list):**  2.B What do all the materials that interact with the magnets have in common? |
| http://cse.ssl.berkeley.edu/SegwayEd/lessons/exploring_magnetism/Exploring_Magnetism/Exploring_Magnetism_images/spacer_white_13x13.jpg | | |
| 3. | http://cse.ssl.berkeley.edu/SegwayEd/lessons/exploring_magnetism/Exploring_Magnetism/Exploring_Magnetism_images/spacer_white_13x13.jpg | What happens when you bring a compass near a magnet? How does it depend on where you place the compass? Draw or explain. |

4. Arrange your compasses around on of the bar magnets as shown below.



5. The compass needle is a tiny \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ suspended on a pivot. So it will turn with minimal \_\_\_\_\_\_\_\_\_\_\_ if a magnetic force is applied to it.

**Part 3**

6. On the back of this paper where it says “mapping an electromagnetic field”, place a bar magnet on top and in the middle of the paper. Trace the magnet on the paper and identify the North and South Poles. Put your magnet back on your paper.

A. Draw a dot somewhere near the magnet and place the center of the compass over the dot, label the dot “start 1”(in color 1)

B. Draw a dot at the location of the compass needle head or tail (the red or black part) on your paper and draw an arrow showing the direction the compass is pointing.

C. Move the compass center to this new dot, and again draw a dot and arrow showing the direction the compass is moving. You stop the line once the compass takes you to the magnet or the edge of the paper.

D. Do this four more times using three different colors. Be sure to label all of your start dots!

E. F. Pick another spot near the magnet and repeat the process (Step A-E)

|  |
| --- |
|  |

**Part 4: Collect two bar magnets and iron fillings.**

1. Place the iron fillings bag above the magnet and shake it gently spreading the filings out. Record your observations below.

|  |  |
| --- | --- |
| S | N |

2. Place two bar magnets next to each other as shown below. Place the bag of iron filings above the magnet and draw what you observe below.

|  |  |
| --- | --- |
| N | S |
| S | N |

3. Place your magnets as shown below. Gently shake the iron filling bag and place it above the magnets. Draw what you observe.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S | N | Space between bars | N | S |

**Mapping an electromagnetic field**

**Comprehension Questions: Answer using complete sentences with a restate. Be sure to use a credible resource.**

1. What is the electromagnetic field?

2. What do you think you were drawing when you were “mapping an electromagnetic field”?

3. How is this similar to Earth’s magnetic field?

4. Why is the electromagnetic field important?

B. What does it do for Earth?

5. What would happen if the electromagnetic field flipped?