

Tales of Magnets and Nails

Name _____ Per _____

Your Goal: is to investigate and describe the ways in which a magnet interacts with an iron nail. When do they **attract** each other (pull together)? When do they **repel** each other (push apart)? You will first make some predictions, then test your predictions!

Things you will need: Bar magnet Iron Nails
 Support Stand String

Part 1: One magnet, one nail

1. In how many different positions and in what ways do you think a **magnet** and a **nail** might interact? When will they attract? When will they repel? Could something else happen?

In each space in the **first column** below, draw a bar magnet  and a nail  in different positions, close to each other but not touching. Label the different ends of the magnet in each drawing with N and S. In the **second column** predict what you think the magnet and nail will do when the two are placed together in that position (attract each other, repel, etc.). You will fill in the **third column** when you get to **Part 2.**)

Sketch positions of magnet and nail	Predict what will happen	Describe what really happens?

Experiments in Magnetism Across Scale

Positions of magnet and nail	Predict interaction	What really happens?

Experiments in Magnetism Across Scale

Positions of magnet and nail	Predict interaction	What really happens?

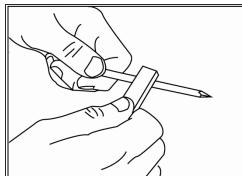
2. Now, get a **magnet** and a **nail** from your teacher and see for yourself. Try the positions in each of your drawings and write what actually happens when the magnet and nail are placed together.
If you can think of some other ways to place the magnet and nail, draw them *on the back* of this page and describe what happens.
3. Write a few sentences to describe what you found out in your investigation.

Experiments in Magnetism Across Scale

4. Explain what you think **causes** the interactions you observed between the magnet and nail.

Part 2: One magnet two nails.

1. Get a second nail so that you have a magnet and **two nails**.
2. Rub the **full length** of one nail twenty times, quickly in **one direction only** (from **head to tip**) using **one end** of the magnet.
3. Hang the rubbed nail from a support with a string, so that it balances evenly.
4. Rub the full length of the **second nail**, also twenty times quickly in one direction (also from **head to tip**) using the **same end of the magnet** that you used before.
5. When you are finished rubbing the nails, place the magnet **far away** from the nails.
6. Use your investigative skills to explore the ways in which the two nails interact. Describe, in terms of the nails' tips and heads, what you observe.



Experiments in Magnetism Across Scale

7. In what ways do you think the nail was changed when you rubbed it with the magnet?

8. Now, take the second nail again and rub the full length of the nail in the **opposite direction** (from tip to head) using the **same end of the magnet** that you used before.
9. Again, place the magnet **far away** from the nails
10. Describe (in terms of the nails' heads and tips) how one nail has an effect on the other.

11. Can the nails affect each other **without touching**?
12. How is the second set of interactions between the two nails different from the first?

13. Explain what you think happened to the second nail when you rubbed it in the opposite direction.

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