Name _____ Date _____

Physics Lab #35 (45 pts)

Period _____ Mrs. Nadworny

Partners: Due Date _____

Magnetism

NO Lab Write-Up Required

Purpose

- To test the magnetic field of the Earth
- To test a magnetic force
- To make a temporary magnet
- To determine the magnetic field around a bar magnet

Materials

○ 2 bar magnets	○ iron filings	○ cardboard	○ paper	○ pendulum clamp
○ small compass	○ iron nail	○ ring stand	○ paper clips	○ binder clip on string

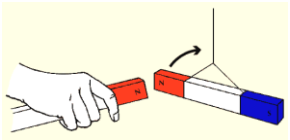
Procedure

Part 1 – Polarity Check (1 pt)

1. The blue end of your magnet is the north end of the magnet. If you feel your magnet has switched polarity, please report it to your teacher.
2. Every small compass has a different polarity. To check the polarity of your compass, place it on a flat surface far away from any bar magnet, iron or steel object.

    - Note which end of the needle points north (blue/red or silver). This is the N pole of the compass. Note below which end of the compass (blue/red or silver) points north.

      North end of compass _____



Part 2 – Magnetic Force (Observations 1 pt each)

3. Hang one bar magnet from the ring stand with the string and binder clip. Bring the N pole of the second magnet near the N pole of the hanging magnet. Record your observations.

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4. Bring the S pole of the second magnet near the N pole of the hanging magnet. Record your observations.

    _____

Part 3 – Induced Magnetism

5. Use the N pole of the magnet to try to pick up some paper clips. Try to make a chain of paper clips. Record your observations.

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6. Use the iron nail by itself to try to pick up the paper clips. Record your observations.

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7. Pick up the nail with the N pole of the magnet and then try to pick up some paper clips with the nail. Record your observations.

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8. Bring your compass near a large iron or steel object, like a radiator or a metal door frame. Record your observations. *(Verify results with teacher before recording)*

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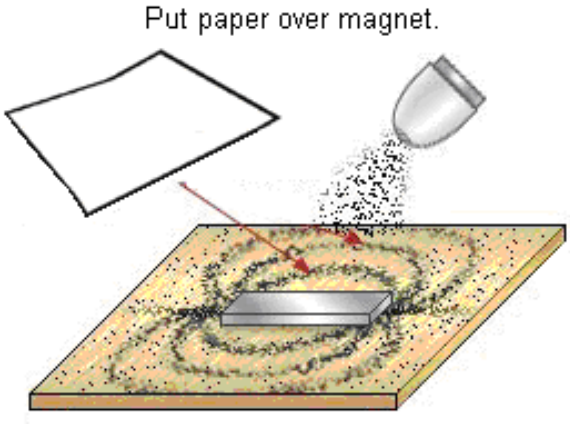
Part 4 – Finding the Magnetic Field using Iron Filings



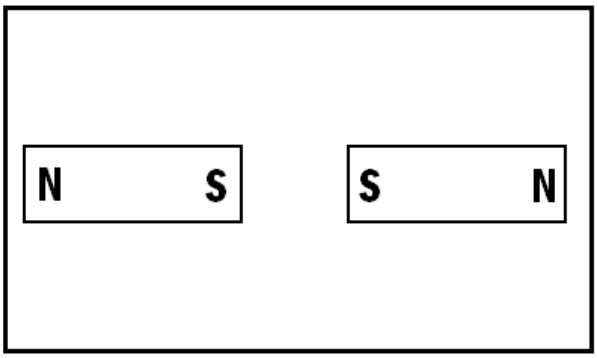
9. Place the magnet flat on the cardboard. Then place a blank piece of paper on top of the magnet.

10. Sprinkle a **small** amount of iron filings lightly over the top of the paper. Try to evenly coat the paper with a fine layer of iron filings. Tap the cardboard **lightly** until a pattern appears. Sketch this pattern on the diagram below. Be sure to label each end of the magnet. (3 pts)

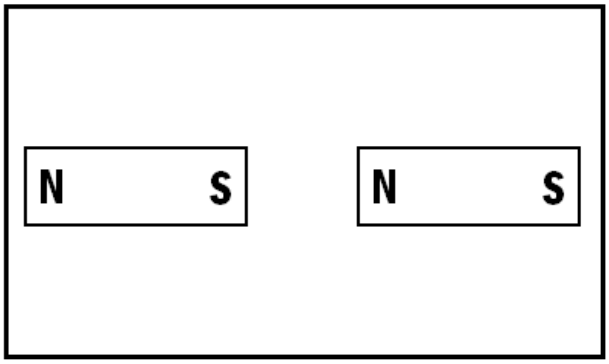
11. Carefully lift up the paper and pour the filings back into the cup.

12. Now, arrange your two magnets underneath the paper as shown in each of the following diagrams. Repeat step 10, sprinkling the filings lightly over the paper to reveal the magnetic field pattern in each case. Sketch the patterns on the diagrams. (9 pts)

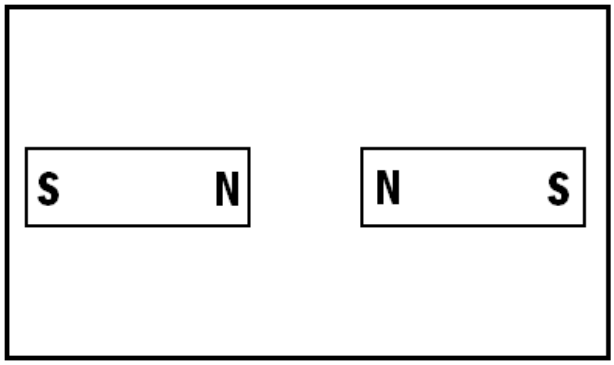
a)



b)



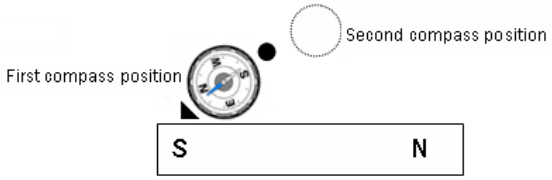
c)



Return the iron filings to the jar of filings. You are done with them.

Part 5 – Finding the Magnetic Field using a Compass – Each member must complete this part on their own!

13. Place the bar magnet flat on the outline on the last page of this lab.
14. Place a compass flat on the tabletop overlapping the circle near the S pole of the magnet.
15. Draw a small arrow on the paper at the tip of the compass's N point. The arrow should point in the direction that the N pole of the compass is pointing.
16. Draw a dot on your paper at the top of the S pole of the compass. (See diagram).



17. Move the compass to the second compass position. Again draw an arrow and a dot just as you did in steps 15 and 16.
18. Move the compass and repeat this process of drawing dots and arrows until all the positions are completed.
19. Remove the compass and connect the arrows and dots you've drawn with a smooth curve or straight line. This is called a magnetic field line. It should look like the field lines you discovered in part 4.
20. **ATTACH YOUR DIAGRAM TO YOUR LAB. EACH MEMBER OF THE LAB GROUP NEEDS THEIR OWN DIAGRAM**. (12 pts)

Post – Lab Questions (2 pts each)

1. Explain why is one end of the bar magnet is referred to as North?

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2. Based on your observations, what is a compass made of? Explain.

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3. Why doesn't a compass give a true reading of North near a large iron or steel object?

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_____

4. Why does a nail not pick up paper clips on its own, but then pick up paper clips when it's in contact with the magnet?

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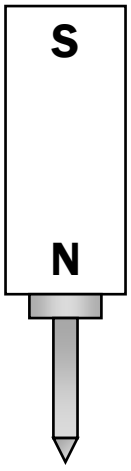
5. On the diagram provided, mark the N and S poles of the nail when it is contact with the magnet.



6. Write a general rule for the directions of magnetic field lines, using the results of your observations in part 5.

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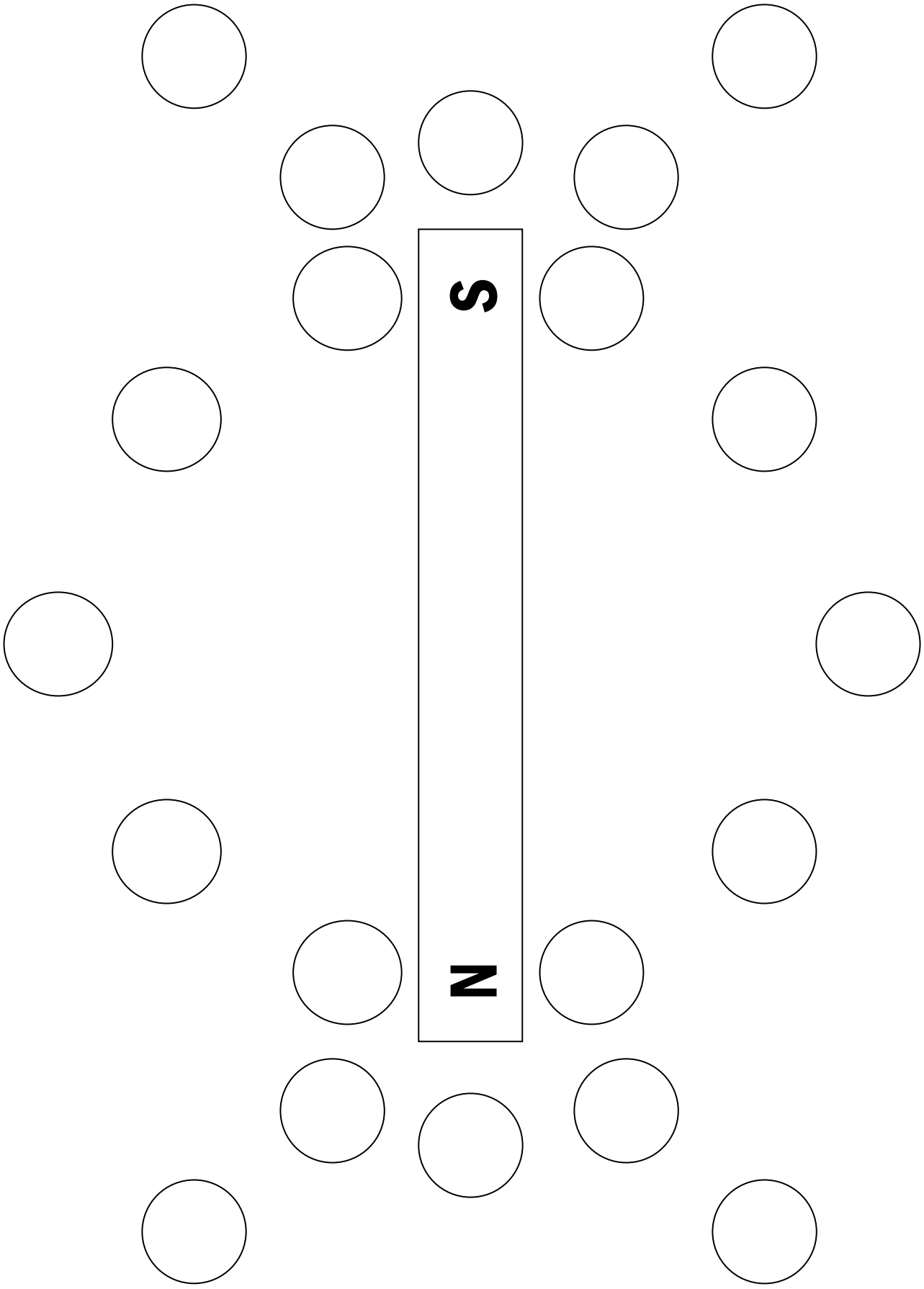
S
N