**Magnetism vs. Electrostatics**

One of the most common misconceptions that students learn in elementary school is that magnetism works because of positive and negative charges.

1. Why do you think that is the case?
2. What do these two things have in common?

Today you’re going to investigate any ***differences*** you can find between the static electricity and magnetism.

1. Charge your white plastic pvc tubing by rubbing it with the paper towel and then set it on the spinner.

Rub the small white plastic strip with the paper towel and bring it near the end of the pvc. What happens? Draw a picture.

1. If you think about the balloons and sweater demo, what do you think is happening with these two pieces of plastic? You’re welcome to pull up the simulation if it helps.
2. One at a time, test out your 1. big clear strip, 2. Small nail, 3. paper clip, 4. Wax coated paper cup, 5. aluminum foil. (make a table to report your observations. Include the small white strip as well as the above 5 items.)
3. What do you think is happening between the objects that attract? (Remember that the balloons on Wednesday attracted to both the sweater and the wall for different reasons.) How can you figure out which reason your objects attract?

This is hard. Need class discussion. Also hard because they don’t take the clear strip (+ charge) and compare the results to the white tubing so they don’t see the polar objects and conductors attract both.

Magnets

1. Play with just the two magnets. What do they do, describe in detail how they act, check both ends.

Play with the compass around the magnets. Also use the simulation *Magnets and Electromagnets.*

1. Do your magnets and compass behave the same as the simulation? Describe how the compass reacts to the magnet.
2. Would the idea that the compass needle is just a magnet fit in with your observations? Why or why not?
3. Hold your magnet near the white pvc tubing (you might have to recharge the tubing). What happens? What if you use the other end of the magnet?
4. Are they attracting because of static electricity or because of magnetism? Why?
5. Hold the compass near the pvc tubing. Carefully move it around and compare how the compass acts with the pvc and with how the compass acts while being moved around the magnet.
6. Try the magnet with all six of the objects in your table. What happens with each (make another table for this)?
7. Do any of the items react differently to opposite ends of the magnet? If so, which ones?

Questions for class discussion:

1. Are there any items that are attracted to the pvc tubing but not to the magnet? If so, which ones?
2. Are there any items that are attracted to the magnet and not the pvc tubing?
3. Based on these findings, can you think of a quick way using all these items to test which ones are attracted because of a net charge (electrons being rubbed off – like the sweater and balloons) versus polarization (negative charges moving further or closer to the charge - like the wall)?
4. We have a pretty decent visual of what is happening in the charged objects. Electrons are being moved from one object to another creating an imbalance of charge. Or the electrons are moving a tiny bit in side a material (like the wall) so that they are either closer or further from the charged object.

What about for the magnet? What does that look like inside?

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|  | **Reaction to pvc** | **Same/opposite charge?** | **North pole** #13 &14 | **South pole** |
| White plastic strip |  |  |  |  |
| Big Clear strip |  |  |  |  |
| Small nail |  |  |  |  |
| Paper clip |  |  |  |  |
| Wax coated paper cup |  |  |  |  |
| Aluminum foil |  |  |  |  |
| Pvc tubing |  |  |  |  |