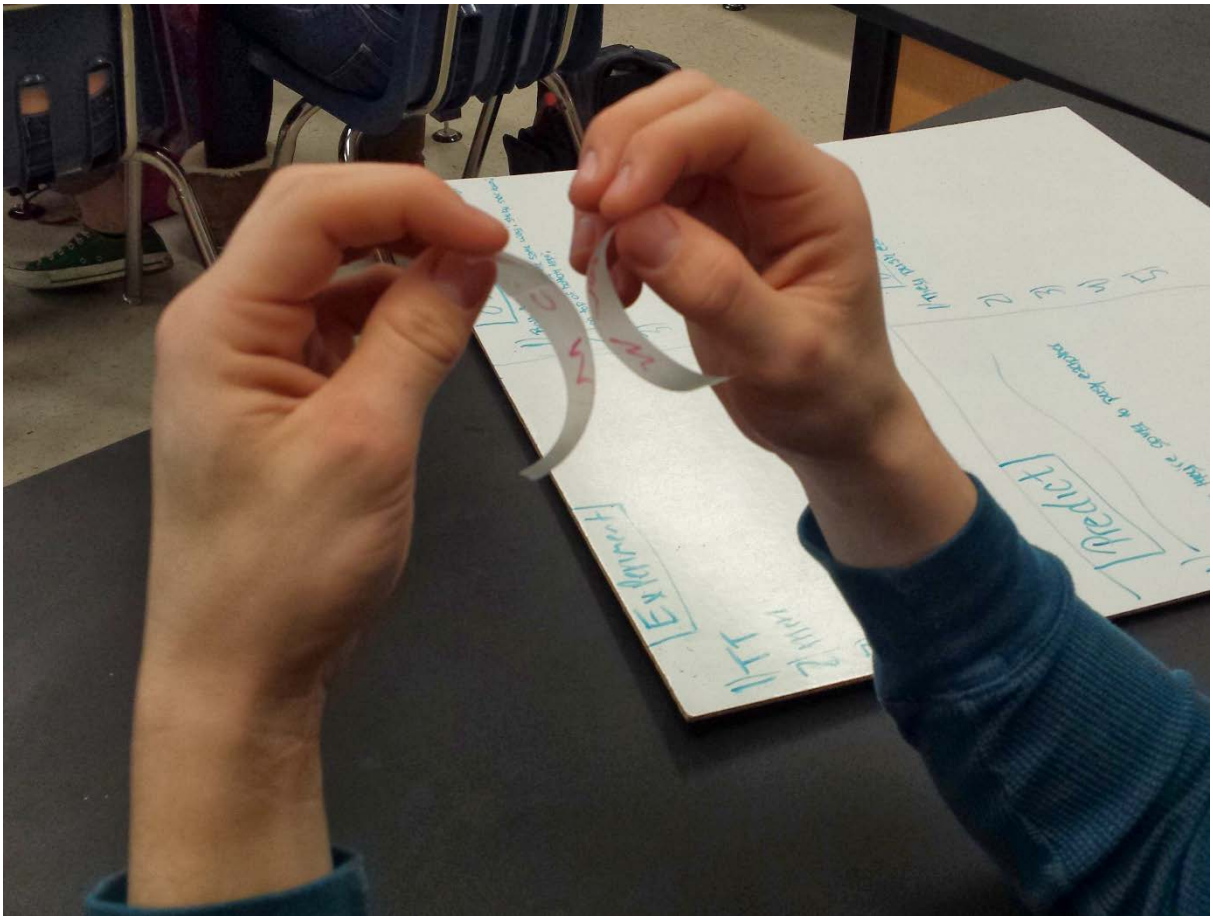
Inquiry Question

Why do socks stick to towels when you take them out of the dryer? What is static electricity? How can you create a static charge?

Name: _____ Date: _____

Get a spool of plastic tape. Pull a couple of long strips from the roll, about 20cm each. Hold them up by their ends so they hang downwards, then slowly bring them side by side. Notice that they repel each other? If you try to force the dangling lengths of tape to touch together, they'll swerve and gyrate to frustrate your efforts. You can stick the strips to a door jamb and on a dry day they will keep repelling each other for several minutes. They will also "attack" anyone who passes through the door. Obviously the tape has become electrically charged. But how? After all, no friction was involved. Something odd is going on.



General Instructions

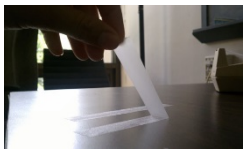
In this experiment, we will examine the properties of static electricity and learn how to create a charged object.

Materials you'll need:

- ☐ Your course notes
- ☐ The internet
- ☐ a roll of clear sticky tape. *SCOTCH 3M Magic* brand does NOT work well. The company seems to have added some anti-static properties to this tape. A cheap roll works best.
- ☐ smooth, clean table top to stick the tape to
- ☐ a balloon
- ☐ a partner

Procedure:

Create a table (example below) and perform the experiments suggested

Experimental Procedure	Predict what will happen. Be sure to use the electrostatic terms discussed (attract, repel, neutral, etc.)	What happens? Be sure to use the electrostatic terms discussed (attract, repel, neutral, etc.)
Experiment 1: • Stick 2 strips of tape to the table. Gently peel off each strip and fold over the top 1cm or so to make a non-sticky handle. • Have a partner hold this strip by the handle so that it hangs freely. • Repeat with the other strip. • Slowly bring the two strips towards each other. 		
Experiment 2: • Stick one strip to the table as above. Now stick a piece of equal length directly on top of the first strip. Make sure that the second strip is stuck ONLY to the first strip and not the table. • Gently peel off the top strip and fold over the top as above. Pass to partner.		

	• Repeat with the bottom strip. • Slowly bring the two strips towards each other. 		
	Experiment 3: • Peel 1 strip of tape from the table, fold over the end to make a handle, and slowly bring this strip near something neutral like a wall.		
	Experiment 4: • Repeat experiment 1 except DISCHARGE the first strip by gently running the entire length of tape between your fingers a few times. • Peel off the second strip and bring them near one another.		
	Experiment 5: • Repeat experiment 1 except DISCHARGE BOTH strips by gently running the entire length of tape between your fingers a few times. • Peel off the second strip and bring them near one another. • Keep these strips discharged for Experiment 6 below:		
	Experiment 6: • Take each discharged strip above (stick loosely) their adhesive (sticky) sides together. • Gently peel them apart, then bring them slowly together as usual.		

Ideas and Hints

- the less you handle the "peeled" tape, the better. It tends to discharge rapidly with contact.
- a dry, non-humid, day works best for this experiment
- be sure to review the rules of electrostatic repulsion and attraction before you begin.

Project submission:

- Upload your completed work to the Physics project drop box if you chose to submit online.
- You can either submit photos/video of your project (along with an explanation and/or steps of construction) or, if you can drop-in to the school, you can present it to your teacher in-person.
- Be sure to carefully organize any data collected so that any other student or teacher could reproduce your experiment and achieve the same results.

Project Timing:

- In its most basic form, this project will take the average student 1 hour. Locating all of the materials needed may vary.

Extension Questions and Experimental Design:

1. Rub an inflated balloon on your hair. Then bring the balloon near a wall. What happens? Does the balloon stick?

2. Assuming that it is known that a balloon, when charged this way, becomes negatively charged. How can we use this fact to determine the charge of the sticky tape when peeled off the table? When peeled off another piece of tape?

3. Can you explain the results of experiment 6? Why would peeling them in this way NOT create a charge on either strip? How is this different than the other ways we created charge?