Synopsis: Sticky Charge Detector

In this activity we will observe how one charged object affects a second charged object. We will use our observations to develop a general rule for how charged objects interact.

This activity is based on "Electric-Charge Interactions" from Physics and Everyday Thinking.

Standards

4th Grade

1e. Students know electrically charged objects attract or repel each other.

9-12th Grade

5e. *Students know* charged particles are sources of electric fields and are subject to the forces of the electric fields from other charges.

5m.* Students know static electric fields have as their source some arrangement of electric charges.

Driving Questions

1.) How do charged things interact with other charged things?

Learning Objectives

1.) Students will learn that there are two types of charge: negative and positive.
2.) Students will learn that:
- a neutral object is charge balanced. It has ~ the same number of electrons (negative charge carrier) as protons (positive charge carrier)
- a negatively charged object has extra electrons
- a positively charged object has some electrons removed

3.) Students will observe how charged objects interact to see that:
- objects with like charges repel
- objects with unlike charges attract

Sticky Charge Detector

Procedure

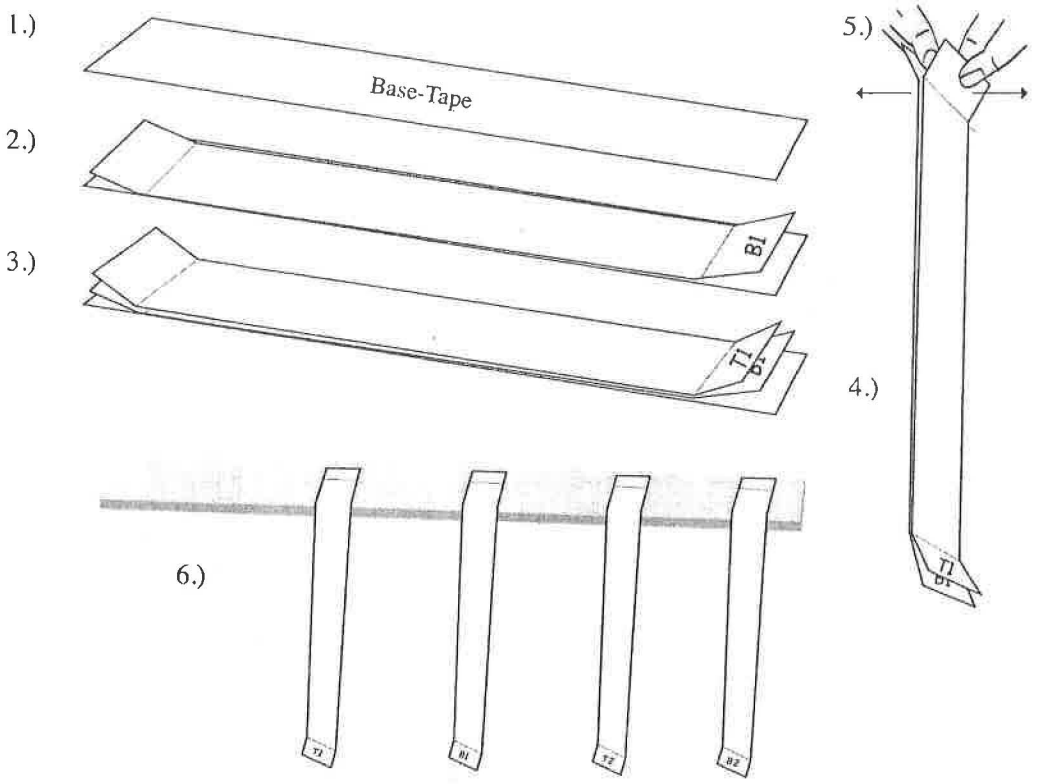
Explore in groups of 2.

You will need the following materials:

- Scotch tape (5 ~6-8 inch strips)
- Marker
- Meter Stick for a support stand.
- Patience

Preparing charged objects:

1.) **Strip 1:** Place one strip of tape on a flat surface sticky side down. This will be your base-tape and will not be removed during this activity.
2.) **Strip 2:** Fold over ~1/2 inch of tape on either end. Place strip 2 sticky side down directly on your base-tape strip. Label strip 2 on the folded over flap: B1 (for Bottom trial 1). The unlabeled fold will serve as a handle.
3.) **Strip 3:** Fold over ~1/2 inch of tape on either end. Place strip 3 sticky side down directly on your B1 strip. Label strip 3 on the folded over flap: T1 (for Top trial 1). Again, the unlabeled fold will serve as a handle.
4.) Slowly pull the conjoined B1 and T1 off your base-tape.
5.) Holding the unlabeled handles quickly pull B1 and T1 apart. Attach the ends of B1 and T1 to your support stand.
6.) Repeat steps 2-5 to create B2 and T2. Attach these to your support stand.



Quick follow up questions:

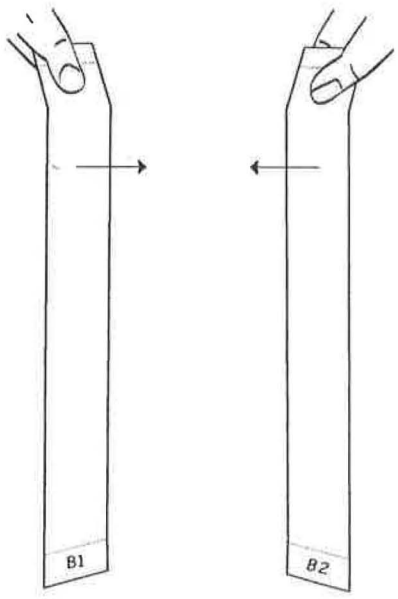
1. The test strips are charged either + or -. Based on how we prepared our strips, do B1 and B2 have the same charge or different changes?

Testing charged objects:

Our goal is to see how each strip interacts with each other strip.

1.) Lets start by testing B1 and B2. Slowly bring the test strips close together and record your findings in the data table below. Write A if the strips are attracted, R is the strips are repelled, or X if there is no interaction.
   a. Are your results reproducible?
   b. If there is an interaction, does distance between strips seem to matter?
   c. Flip B1 around and see what happens when you bring the opposite face towards B2. Did the interaction change?

2.) Test each of the other pairings and record your findings in the data table below.



	B2	T2
B1		
T1		

Save your test strips for the next two activities!

Quick follow up questions:

1. Write a general rule for how like charged objects interact and how unlike charged objects interact.
2. From this experiment, can you tell which objects have a positive charge? Which have a negative charge? How? … or Why not?

Instructor Notes: Sticky Charge Detector

This activity, like all electrostatic activities that rely on building up and maintaining a charge, can be a bit temperamental. It will work best on a dry day with very low humidity. Working with tape can be a challenge (with young hands and not so young). Be patient and plan on wasting a bit of tape.

Safety

This activity has little to no risk associated with it. Use common sense.

Materials

- Scotch tape (5, ~6-8 inch strips)
- Marker
- Meter Stick to make a support stand.

Notes