

INVESTIGATION 1: ELECTRIC CHARGE AND FORCE

Materials:

- Transparent tape

Activity 1-1: Creating Charges/Forces

For those of you who have 'flushed' previous parts of this course, recall that if an isolated piece of matter moves from rest (accelerates), some net *force* must have been exerted. We will be causing pieces of matter, initially at rest, to move (accelerate) without 'touching' them.

If we are to remain consistent with the Physics we have learned to date (and so the 1800's investigators thought), we must have 'caused' a new force to operate. It is the complete description of that new force that we will undertake.

Do *this* investigation in teams of two (2). Each partner should take a strip of tape 10 cm long, bend one end over in a triangle to make a non-sticky handle, and stick it to the lab table. Quickly peel the tape off the table, and bring the non-sticky sides of the two lab partner's tapes together. Do not touch the tapes to each other or to anything else. Do not let the tapes curl back and touch your hand.

Observe the interaction, focusing on what happens to the free ends when you bring the sticky sides near each other? Repeat several times until you are confident of consistent results. After 3-5 trials, use new tape.

I observed:

The distance between the tapes seemed to make the effect stronger/weaker.

When the two pieces of tape were peeled off the lab table, they received a 'net charge'. Discuss in your team. Do you expect the charges on each tape to be the same/different? Is there a one-component/constituent theory that will explain this?

Explain your reasoning.

Activity 1-2: Kinds of Charges/Kinds of Forces

Each partner place a strip of tape on the table, and mark on it “B” for bottom. On top of that, place another piece of tape (making sure the top piece doesn’t overlap and touch the table), labeling it “T” for top. Each partner pull the tapes off the table, and then separate the two pieces into your two hands.

Now do some tests between partners.

How do the tapes react when you place the sticky parts of a T and a T tape near each other?

How do the tapes react when you place the sticky parts of a B and a B tape near each other?

How do the tapes react when you place the sticky parts of a T and a B tape near each other?

According to your observations, do top strips and bottom strips have the same electrical properties, or different? Explain your reasoning.

In this experiment, I claim you produced *two* kinds of charge.

Which of the following statements are consistent with your observations of the tapes so far?

- Like charges appear to repel each other
- Like charges appear to attract each other
- Unlike charges appear to repel each other
- Unlike charges appear to attract each other
- Cannot conclude any of the above.

These investigations based upon Workshop Physics by Priscilla Laws.