**Coloumb's Law Lab**

Name_____
Period_____
Date_____

**1. Open Logger Pro**
Do this from the dock. ->

**2. Select the Movie**
On the menu bar to to **insert -> movie**
and select Coloumb's Law Lab from the desktop.

**3. Enlarge the Movie Window to Maximum Size**
Grab the right hand corner of the **movie window** and enlarge the window to fill the area of the graph. If you get it to fill the graph from top to bottom and then click on the green button (upper left of window) it will be at its maximum size which is great for taking the most accurate data.
**Warning**! If you accidentally click on the graph the **movie window** will be hidden behind the graph. Luckily you can see a tiny piece of it under the graph. Click on this tiny piece the **movie window** and it will come back in front of the graph.

**4. Play the Movie**
Using the controls at the bottom left hand corner of the movie window play the movie. You will see a charged sphere in the middle of the screen (we will call this **sphere 1**). Another charged sphere (we will call this **sphere 2**) will enter from the top and begin to exert an electrical force of repulsion on sphere 1. **Before you move on**, reset the movie to the beginning. The goal of this activity will be to use this movie to begin to create a **mathematical model** that accurately describes the electrical force interaction.

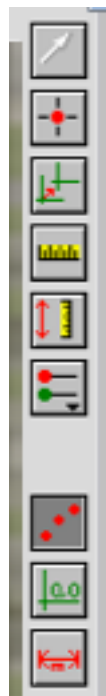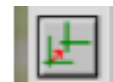**5. Open Up the Video Analysis Tool Bar**
Click on the button at the lower right corner of the movie window --->
(red dots and black arrow) to open the video analysis tool bar.

The data tools will open on the upper right part of the movie window. ----------------->

**6. Setting the Origin**
First, **set the origin** at the lower edge of the sphere that is in the middle of the screen. To do this, click on the third button from the top of the video analysis tool bar. A set of **cross hairs** will appear on the screen. Take these cross hairs to the lower edge of sphere 1 and click to set this point as the origin. If you make a mistake, no worries, just realign the cross hairs with the bottom edge of the sphere and click again.

7, **Set the Scale**
Now you must select the scale. To do this, click on the forth button from the
top of the video analysis tool bar.   A set of cross hairs will appear again. You
will measure 1 cm distance on the background graph in the movie. This is
the distance of five lines. Click on the edge of one line, drag to the fifth line, and release.
A green line will appear and a dialogue box. Record the distance ( 1 cm) in the dialogue
box and click "OK."

8. **Using the Measuring Tool**
You will be making two types of measurements. Be sure to understand the difference.
**Measurement #1**: the distance sphere 1 moves from the origin
(this is the origin you have just set). This distance represents
the **electrical force** this sphere experiences from the other
sphere.
**Measurement #2**: the distance between the two spheres.

Play the movie until the top sphere first appears. Use the
movie controls to **single step backward** or **forwards**, if
needed.
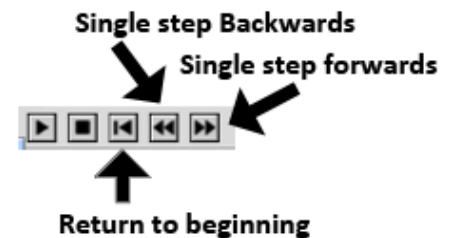
Now you are ready to make your measurements. Open the **photo
distance** measurement tool by clicking on the fifth button from the top of
the video analysis tool bar. Another set of crosshairs will appear.

**Measurement #1:** To make this measurement you align the cross hairs with the origin
of sphere 1 (the center of the yellow lines which you set earlier), click and drag to the
new location of the edge of sphere 1. The measurement will be indicated in the upper
left hand corner of the movie (follow the black line). Record this in your data table.
**Measurement #2:** To make this measurement you align the cross hairs with the lower
edge of sphere 2, click and drag to the the lower edge of sphere 1. Record this in your
data table.

9. **Collecting Data**
Collect at least 7 pairs of data points by clicking the movie forward so the spheres are in
new locations each time.

10. **Looking for Relationships**
To see if there is a relationship between the **electrical force** and the **distance** use
Graphical Analysis.
x axis: Graph the distance between sphere 2 and sphere 1. Label this **Distance.**
y axis: Graph the distance sphere 1 moved (represents the electrical force). Label this
**Electrical Force.**