**Lab: How do Phones Charge? *(Instructor Version)***

*This is a two-day project. Day one you will need 5-10 minutes at the end of class to explain activity 1 to your students. During this time, you can discuss good data collecting techniques and how to individualize the project (different time intervals, having phone on airplane mode, watching videos while charging, etc.) Day two will take most of the 50 minutes class.*

**Motivation:** Sometimes phenomena can be misleading and appear to have a linear model, but with some data gathering/analyzing, we can determine whether a linear model is appropriate or whether we need to use a different function to model the phenomena.

**Objectives:** Students will be able to find the equation of the line of best fit.

**Materials:** Phone/tablet that needs to be charged; charging cable; data collecting table for Activity 1

**Activity 1:**

*Each student can record the data at home so no class time is wasted. You should spend about 5 minutes before students collect data to discuss good data collecting techniques.*

Students will need the Data Collecting Table to record their data.

Start with a cell-phone or tablet that has a depleted or very low battery. Yes, that means you must drain your battery in your phone or tablet. To gather your data, charge your phone and record the percentage of battery you have at equal time intervals until your phone is fully charged. Note: Your phone should be on (to see the percentage) but for accurate data, you should refrain from using your phone until all the data is collected.

**Activity 2:**

*(You should spend about 5 minutes discussing why the line of best fit can give predictions and how to find it. The activity should take 20-25 minutes)*

Graph your data and determine the equation of a line of best fit. Sketch this line on the same axis as the data.

1. Use your line of best fit to predict what percentage your battery will be at 7 minutes after you begin charging it.
2. Use your line of best fit to predict what percentage your battery will be at 24 minutes after you begin charging it.
3. Use your line of best fit to predict what percentage your battery will be at 1 hour and 12 minutes after you begin charging it.

**Activity 3:**

*(This activity takes 10-15 minutes and can be a class discussion to TPS.)*

Does your curve look linear? Is it a good idea to use a linear model to represent this data?

1. Were your predictions from part 2 over estimates or underestimates?
2. Are your predictions reliable?
3. What could make your line of best fit better?