The following lab summary is a good example **EXCEPT** that it should have been **DOUBLE-SPACED**. As a result, several instructor comments had to be made on a separate page, and are not included for your viewing pleasure. (More extensive instructor comments were also made in the lab notebook itself.)

SHOULD BE DOUBLE-SPACED!!

Experiment 01: Simple Pendulum

English?

We started out the experiment by examining our pendulum apparatus and making note how it worked. After reading through the Physics 28 Lab Manual we measured our weights with hooks attached and wrote down those values. We measured the length of the pendulum straight down from the pivot point of the string to as close as we could get to the center of mass of our smaller mass. We assumed this same length for our larger mass. (p. 3)

Our first experiment's objective was to find the relationship between the pendulum's mass and its period given constant length and maximum amplitude. Each mass was allowed to go through 20 periods before it was stopped and then restarted for another 20 periods, allowing us to record 40 different period times. We did this in the hopes of getting accurate data with a small standard deviation of the mean (pp. 5-7). The varying mass experiment took all of the first day.

In our second experiment we set out to test the period's dependence on maximum amplitude, θ. For this experiment we kept mass and length constant and observed 4 different max amplitudes. We used a protractor and our eyes to give the experiment the desired amplitude (p. 3). Each amplitude was allowed to run for 10 periods, after which the pendulum was stopped. We found the average, the standard deviation, and the standard deviation of the mean for each max angle θ (p. 9).

ok.

Next we kept max angle and mass constant while varying length in an attempt to test for period's dependence on length. We found that our most reliable angle was 15°, so we used that as our max amplitude. We used 5 different lengths, each changed by 10cm increments. Each length was allowed 10 periods before it was stopped and the apparatus set up for the next length (p. 11). We used a meter stick to measure the length of the string before each trial. This process became arduous and may have led to inaccuracies in our reported string lengths (p. 27). We calculated the average, the standard deviation, and the standard deviation of the mean for each experiment.

should be interspersed w/ data-taking.

Finally, on Day 3, came our analysis. We had only two masses to compare and so could not make any guess as to what a best fit line would look like. All we could say is that our data seems to show that an increase in mass leads to an increase in period time (p. 13). This was inconsistent with the accepted mass-period relationship, which states that period is completely independent of mass. Our discrepancy was most likely due to our assumption that the length used for the larger mass was the same as the length used for the smaller one. This assumption may have caused the significant discrepancy between our results and accepted physical relationships (pp. 21-23).

good quantitative arguments.

We used Kaleidagraph to plot the results of our varying angle experiment, and we managed to create a beautiful best fit line with a chi squared value of 0.0337 (p. 15). Given the same experimental parameters, we could predict the period with a given angle with great precision. Through research we found that period is indeed dependent on maximum angle, but the relationship was complex beyond our understanding. There was no way to accurately compare our results with accepted values. Instead we used an ad hoc method of testing the validity of our experimental data (pp. 23-27)

Our varying length experiment had the most off-base results, with a best fit line whose chi squared value was 4.72. On our graph we considered error in time to be most important (p. 17). We concluded, though, that the physical parameters of the experiment made it difficult to accurately obtain length measurements (p. 27), and so the error in length was more severe, and thus more important than the error in period time. Error bars of ±0.5cm have been added to our graph, and one can see that our best fit line would fit even better given these horizontal bars (p. 17). Our results were inconsistent with the accepted length-period relationship of $T=2\pi\sqrt{(l/g)}$ (pp. 29-31).

OK-honest description!

good.