PHY 201/181 Lab Instructor notes
Lab 6: Energy Exchange in Mechanical Systems
Fall 2003

Instructions for the students

- Demonstrate how to measure the spring constant and how to place attach the spring mechanism to the airtrack.
- Introduce, without formulas, the transfer in energy that occurs in each portion of the experiment.
- Show the students how the glass plunger fits into hole at the end of the car.
- Demonstrate how to find the x_0, the position where the car just starts pressing against the glass rod.

More notes

- This lab seems to take a lot of time!
- This year, I tried to shorten up the first part of the lab by making a direct measurement of the spring constant. The bad part is that x_0 will have to be determined later in the lab. The other drawback with the current procedure is that the students don't get to see the linear relation for the plot of F_g vs. Δy.
- Need to cut up index cards to use as markers in the first part of the experiment.
- When students are done with the first part, you should go around and check that they have reasonable answers for the spring constant. They should have something around $14\,\mathrm{N \cdot m}$ and the two measurements should differ by less than $1\,\mathrm{N \cdot m}$. If not, then they should repeat the measurements. Make sure they work out the units for this.
  - A common error is to not have the spring mechanism completely vertical.
  - The maximum mass added should be roughly $100\,\mathrm{g}$.
- Unfortunately, this lab really drops the ball on error analysis. They compare two different energies, but have no estimate of error to say if the difference is significant!
- At the end of the lab, put the cars, the blocks, the weights, and the calipers at the front of the room.