

PHY 201/181 Lab Instructor notes  
Lab 8: The Harmonic Oscillator  
Fall 2003

General notes:

- Each group needs:
  - a vertical rod,
  - six springs, and weight holder in a bag (spring drawer),
  - masses (both large and small),
  - two small cars with hooks,
  - one medium car without hooks,
  - stopwatches, and
  - flags (1 in. width made from card paper) for the cars.
- You will need tape for the flags and extra labels.
- Measurements should be made with the “left” photogate.
- At the end of the lab, put away the weights and stopwatches. Remove the cars from the airtracks and put the springs back in the bags.
- I am afraid that this lab is too long. Maybe the measurements of the spring constant can be done in an earlier lab? We will need more spring sets to do this.

Beginning of class:

- The computer program reads data from the “left” photogate.
- Graph a sine wave on the board and explain what the amplitude and period are.
- Remind the students  $\log(x)$  is the *natural* logarithm of  $x$ .
- Also, you should do a quick example of a log-log plot. One can use kinetic energy  $= \frac{1}{2}mv^2$  as an example.
- Students don’t seem to know the terminology *A versus B*. They don’t know which is the horizontal and which is the vertical axis. For example, in Section 8.2.2, the “amplitude” is the  $x$ -axis and “period” is the  $y$ -axis.
- In their conclusions, they will compare their experimental results, together with an estimate of error, to a theoretical value. Remind students about the meaning of standard deviation.