

Checklist for Lab #5 – Springs and Karate Boards

Below are the things that are required to be handed in for the lab.

1. Answers to all questions in the lab. If there's no space in the lab, please answer them on a separate sheet of paper.
 2. For the springs portion, you need the plot (and the data) of the force versus the stretch of a spring. Make sure you label the axes and put a trendline through the data. If the data are linear perform a linear regression to determine the uncertainties in the slope and intercept. Report the stiffness of the spring along with its uncertainty from either the slope or intercept.
 3. From the plot of the force versus the stretch of the spring, you need to show the calculation of the work done, with the numbers you used, and how it compares to the potential energy stored in the spring, again showing the calculation with your numbers.
 4. For the karate board portion, you need the plot (and the data) of the force versus the deflection of the board. Make sure you label the axes and put a trendline through the data. If the data are linear perform a linear regression to determine the uncertainties in the slope and intercept. Report the stiffness of the board along with its uncertainty from either the slope or intercept.
 5. Starting from the general definition of work, derive an expression for the work done on the board an added weight. Then for each added weight, determine the expression for the total work done on the board up to the point at which it broke.
 6. Calculate the work done on the board from the area under the force versus displacement curve.
 7. Derivation and calculation of the uncertainty in the work done by the weight of the bricks by propagation of uncertainty.
 8. Derivation and calculation of the height (and its uncertainty) that a mass would have to be dropped from to break a board.
 9. Method to determine the mass of a human fist.
 10. Derivation and calculation of the speed that your hand would have to move in order to break the board.
- For the derivations, you may want to work these out on separate sheets of paper and then transfer them into the lab or turn in the sheets. Make sure they are legible and that you explain what you are doing.
 - All your numbers need to have a unit attached to them.
 - For your uncertainty calculations you need to make sure they are dimensionally correct. If they do not give the correct units then they formula cannot be correct and you need to fix it. If you have to explain sources of uncertainty, human is never a source.