Name: _____ Date: _____ Course: _____ Professor: _____

S1a: Hooke's Law & Simple Harmonic Motion

Read the lab instructions and the appropriate sections of chapter 13 from your textbook before answering the questions. Ask your professor for help in advance to understand the concepts.

1. Write down Hooke's law. If you will choose to use an equation – explain the meaning of each variable.
2. Define frequency, period, and amplitude in a simple harmonic motion.
3. Derive the expression for the period of an oscillating mass attached to a spring using Newton's second law of motion and Hooke's law.
4. Explain what the effective mass is and how you are going to calculate it in the lab.

Working on this lab you will be required to plot two graphs. The first one, in Part I of the lab, is the applied mass as a function of the vertical position. The second graph, in Part II of the lab, is the experimental period of oscillation of the system as a function of the effective mass.

For the First graph:

5. Apply Hooke's law and condition of equilibrium to derive the expected expression for the mass applied as a function of position and required constants.
6. Use the expression you derived above to conclude on the expected shape of the graph.
7. Explain how you are going to determine the spring constant using the best-fit equation obtained for your graph.

For the Second graph:

8. Use the theoretical equation for the period of a mass attached to a spring to conclude on the expected shape of the graph.
9. Explain how you are going to determine the spring constant using the best-fit equation obtained for your graph.