Physics 124 Prelab 4 Week of Feb 13 2017 – Simple Harmonic Motion

Purpose: Use the principles of Simple Harmonic Motion to find the spring constant, $k$, using two methods.

METHOD 1
When no mass is hung from the spring with spring constant $k$, it extends a distance $x$. When a mass $M$ is hung from a spring it extends an additional distance $\Delta x$ downwards from its original position.

a. Write down the sum of the forces on the mass $M$ in the y-direction.

b. Solve for the spring constant $k$ in terms of $M$, $\Delta x$ and any other constants you need to introduce. What are the units of $k$?

METHOD 2
A mass $M$ is hung from the same spring and given a small pull downwards and let go. The spring-mass system starts oscillating with a period of $T$.

a. What is the relationship between the angular frequency $\omega$ and the time period $T$?

b. What is the relationship between the angular frequency $\omega$ and the mass $M$ and the spring constant $k$?

c. Use the above two equations to express the spring constant $k$ in terms of the mass $M$ and time period $T$. 