Simple Harmonic Motion Lab   Name:

Physics II   Date: Period:

Purposes

The purposes of this investigation are:

- ❖ to experimentally measure the following values for a system containing a mass on a spring
  - ➢ the spring constant (k)
  - ➢ the period (T)
  - ➢ the frequency (f)
- ❖ to graph the movement of the mass on a spring as various functions of time
  - ➢ position (x)
  - ➢ velocity (v)
  - ➢ acceleration (a)

In our analysis we will measure these values for three blocks of varying masses. Using string, securely tie the spring to the crossbar of the stand, and attach the block, letting it hang off the side of the table. After measuring the displacement of the end of the spring with a ruler, you now have enough information to calculate the spring constant. Stretch the spring by some arbitrary amplitude (0.1 m is recommended for simplicity), holding the ruler upright and steady. Release the spring (have someone hold down the stand to prevent it from wobbling or falling off the table), and use the stopwatch to time its period. Repeat this process several times until you are confident you have timed it accurately, then test the other two blocks in the same way. Pause here, because the rest of the lab will wait until we have progressed further in the class.

The second part of our analysis will have us graph the movement of our blocks. You will need to formulate the appropriate equations for x(t), v(t), and a(t), and I recommend using a graphing website or similar software to generate the graph itself (desmos.com/calculator, for instance). Draw and appropriately label your results.