Investigating a Spring Pendulum

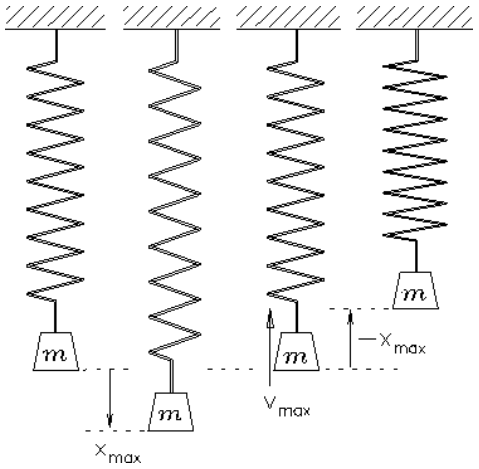
PSI Physics Name_____

An Experiment to Investigate a Spring Pendulum

Problem: Which factors affect on the period of vibrations of spring pendulum?

Theory: When a vibration or oscillation repeats itself, back and forth, over the same time, the motion is periodic. The simplest form of periodic motion is represented by an object oscillating on the end of a coil spring. To discuss vibration, we use a few terms. The distance of the mass from the equilibrium point at any moment is called displacement, x. The maximum displacement – the greatest distance from the equilibrium point is called the amplitude, A. One cycle refers to the complete to-and-fro motion from some initial point back to the same point. The period, T, is defined as the time required for one complete cycle. Finally, the frequency, f, is the number of complete cycles per second.

During this lab we will measure the period of the spring pendulum, and we will investigate which factors affect on it.



Materials: stand with clamp, spring coil, stopwatch, set of masses, ruler.

Procedure:

1. Attach a spring to the stand by using a clamp.
2. Suspend the mass of 50 g from the end of spring.
3. Displace the mass from the equilibrium position (about 5-7 cm), and release it.
4. When the mass starts to vibrate, measure the time with the stopwatch for 10 full vibrations. Write the time in Table 1. Stop the mass and repeat 3-4 two more times. Record these numbers in Table 1.
5. Find the average time (add three numbers and divide by 3).
6. Use the average time to determine the period of spring pendulum T=t/N (period equals elapsed time divided by number of vibrations).
7. Use the average time to determine the frequency of spring pendulum f=N/t (frequency equals number of vibrations divided by elapsed time).
8. Repeat steps 2-7 with different masses (60g, 70g, 80g, 90g, 100g).
9. Use the data from Table 1 to sketch the graph: period vs. mass.
10. Use the data from Table 1 to sketch the graph: frequency vs. mass.

Mass (g)	Trial 1 Elapsed Time (s)	Trial 2 Elapsed Time (s)	Trial 3 Elapsed Time (s)	Average Time, t (s)	Period T = t/N (s)	Frequency F= N/t (t/s)
50						
60						
70						
80						
90						
100						

Conclusion:

1. Make a conclusion about your major results:

   a). Does the period of the spring pendulum depend on the mass?

   b). Does the frequency of the spring pendulum?

2. What do you think the period **and** frequency would be if the mass were changed to 110 g?

3. What do you think the period **and** frequency would be if the mass were changed to 40 g?