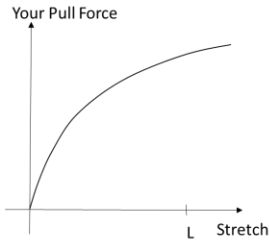
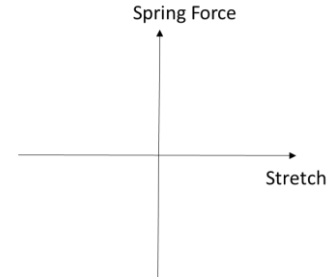


Many motions around us are oscillations. When an object is oscillating, the object's motion comes back to the same position it has been before after a time period T . Consequently, the physics in this situation repeats over and over again. Can you think of oscillating processes? For this week I would like you to review a few of the main principles from PH201 that we need to describe any oscillating body. Sorry, this week again in the lab manual the equations were lost in the printing process.

1. What are the two equations that were missing on the first page of the instructions this week?

2. Consider an ideal physics spring. When you stretch out a spring from its natural length (equilibrium position), you will feel that the spring pulls back on you (remember Newton's Third Law?). What is unique on a spring is, that the spring force is stronger the further you stretch the spring. Find Hooks Law, and conceptually draw a graph with the stretch of the spring on the x-axis, and the spring force on the y axis.



3. We could add Energy to a system by either heat or work. For the oscillators we will describe in lab today, we will add energy in the form of work. In the graph on the right, show the amount of work added to the elastic rubber band from a bungee stretched to the length L . This does not need a calculation.

4. Based on the prior questions, what is the Energy of a spring that is stretched to the length A ? Show a graphical derivation using a force vs displacement graph.

5. Chapter 14.6 covers the damped oscillator. We will cover this today in the lab. Read the two pages in your textbook and then answer the following questions:

a. The Amplitude of a spring oscillator decreases to 50% after one period.

i. What is the amplitude after 3 oscillations?

ii. What is the time constant τ , assuming that one period is 2s ?

b. The Amplitude of a spring oscillator decreases to 90% after one period.

i. What is the amplitude after 20 oscillations?

ii. After how many oscillations is the amplitude half of the original amplitude?

iii. What is the time constant τ , if one period is 2s?