Lab 8: Hooke's Law

Purpose

To test wether Hooke's law is satisfied when stretching a spring, a rubber band and hair band, and to determine their respective force constants.

Introduction

Hooke's law states that the force (F) needed to extend or compress a spring by some distance (X) scales linearly with respect to that distance. That is

$$F = kX, \quad \textbf{Eq. 1}$$

where k is the force constant, a constant factor representing the stiffness of the spring. Springs are not the only materials that obey Hooke's law, in fact most elastic materials satisfy Hooke's law for as long as they are not being stretched close to their elastic limits, where permanent deformations occur.

In this lab you are going to test weather Hooke's law is satisfied when stretching a spring, a rubber band and hair band, and if so you will find out the force constant (k) for each of them.

Procedure

1. Hang the spring from the clamp at the top of the stand.

2. Place the meter stick parallel to the stand and next to the spring.

3. Make a mark on the meter stick at the point where the unstretched spring ends (bottom end).

4. Attach a mass hanger with a small amount of mass to the bottom end of the spring and record the distance (X) from the mark you made on 3 and to the bottom end of the stretched spring. Repeat this step 5 times adding a bit more mass each time.

5. Repeat 1-5 replacing the spring with the rubber band and then with the head band.
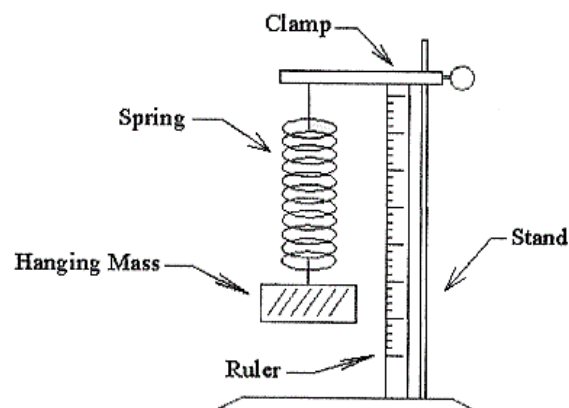
Data Collection

Spring

m = mass (kg)	F = mg (N)	X (cm)

Rubber Band

m = mass (kg)	F = mg (N)	X (cm)

Head Band

m = mass (kg)	F = mg (N)	X (cm)

Analysis

1. Go to <u>desmos.com/calculator</u> and create a table with the force (F) vs. distance (X) values you got for the spring, rubber band and head band. When your are done entering your data click on the Share Graph icon (top right) and save the link to share, you will use this link when submitting you lab via iLearn/ Canvas.

2. Complete the Lab 8 quiz on Canvas.