Lab Instructions

Module Eight Lab Activity

Spring Constant - A Virtual PhET Lab

After completing this lab activity, the students should be able to:

- **Conduct an experiment to determine the spring constant**
- **Calculate the spring constant**
- **Write a lab report**

Lab Report

The lab report must include the following:

- **Title**
- **Introduction**
- **Experimental Details or Theoretical Analysis**
- **Results**
- **Discussion**
- **Conclusions and Summary**
- **References**

Please visit the following website to learn more about lab reports:

ACS Format for Laboratory Reports

An example of a lab report is given on the following website:

Professor K - sample lab report

Lab Activity

Please follow the steps given below to conduct the experiment:

- This lab requires you to produce a lab report to **determine** "**The Spring Constant of a Spring.**" This is the **"Title"** of your lab report.
- Read the relevant chapter on spring constant and Hooke's law and add an **"Introduction."**

You conduct this lab by connecting to the PhET website by clicking on the link given below (or where applicable through the embedded simulation on the lab page):

Masses and Springs

Attribution:

PhET Interactive Simulations
University of Colorado Boulder
https://phet.colorado.edu

(If you cannot use the above simulation or cannot get to the website by clicking on the link, please copy and paste the link into your browser. If the simulation is not running, please check if you have the latest Java, Adobe Flash, or HTML5 software [depending on the simulated lab]. If you download the relevant software and attempt to run the simulation and it is still not working, please call the IT helpdesk. It also could be that your computer does not have sufficient space to run the simulation. Please check all the possibilities).

- For this experiment, you use the **"Lab"** section of the simulation. After you click the lab section of the simulation, select "Displacement/Natural Length," "Mass Equilibrium," and "Movable Line" boxes (upper right-hand corner). Then, select "Earth" and the correct gravity value will appear. Move the "Damping" scale to "Lots" extreme. This will stop the spring bouncing up and down. Now, select the "Spring Constant" scale to the middle (middle of the simulation). Now you can change the "Mass" values as you desired, but you must have at least three different mass values and conduct the experiment that will enable you to find the spring constant by plotting a graph. Once you find the spring constant from the graph, find the masses of the two unknown objects – Red and Blue. You find these masses without changing the spring constant scale, since you will use the spring constant value you found from the graph to find the unknown mass. This information constitutes the **"Experimental Details"** section of the lab report. You must keep a record of all the values appearing on the screen as **experimental values** for the scenario. These values also form part of the **"Results"** section of the lab report. Now, complete the theoretical calculations including the plotting of the graph. These calculated values and the graph form the **"Results"** section of the lab report.
- Now, you can complete the **"Discussion"** section of your lab report by comparing the values and discussing any differences in the theoretical and experimental values and any other information relevant to the experiment.
- Complete the lab report by adding a summary to the "**Conclusion**" section of your lab report.
- Submit the lab report to the relevant Canvas Dropbox

Please watch the following video to learn more about Newton's Second Law and Momentum:

Two ways to find the spring constant - WITH GRAPHS - YouTube

Lab Scenario

1. Calculate the spring constant of the spring by graph method.

2. Calculate the masses of red and blue objects.