CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Sumer A. Mukhey

Project Number
J1813

Project Title
Living in Harmony

Abstract

Objectives/Goals
How does adding mass change the period of a spring? My hypothesis was the more weight added to a mass-spring system will increase the length of the period of the spring#s harmonic cycle in a manner proportional to the amount of weight added. The results of this experiment could help improve a company#s suspension on its machinery such as, improve its spring quality and efficiency.

Methods/Materials
Materials
1. Spring; 2. Three (3) gram weights; 3. Stopwatch; 4. Lab notebook; 5. Graph Paper; 6. Scale; 7. Scientific calculator.
Procedure
1. Measure the mass of one of the weights. 2. Hang one end of spring off a table and let it bounce gently down and then back up. 3. Count number of cycles the spring makes in sixty (60) seconds with no weight hanging. 4. Hang one weight from spring. 5. Count the number of cycles the spring makes in sixty (60) seconds with the weight attached. 6. Perform ten (10) trials for each weight. 7. Repeat steps four (4) through six (6) for a series of different weights. 8. Analyze data. 9. Make another table to convert the raw data into numbers that can be used to determine the spring constant and spring#s effective mass. 10. Make a graph with "Added mass," m, in kilograms, on the y-axis, and T2/4π2, in sec2, on the x-axis. Use kilograms so that the value of k is in units of N/m, which is equivalent to kg/sec2.

Results
The average cycles per minute for 100 grams was 90 cycles per minute. The average cycles per minute for 50 grams was 124.4 cycles per minute. the average cycles per minute for 20 grams was 177.9 cycles per minute.

Conclusions/Discussion
As stated in the hypothesis, the more weight added to a mass-spring system will increase the length of the period of the spring#s harmonic cycle in a manner proportional to the amount of weight added. The more weight added to the spring, the longer the cycle resulting in fewer cycles per minute. The smaller the amount of weight added to the spring, the shorter the cycles resulting in more cycles per minute. The spring constant of the spring was 9.319010397. The spring#s averaged effective mass was 34.06%. The fact that the person counts in their head may affect the results of trials due to miscounting.

Summary Statement
My project is simple-harmonic motion in a spring-mass system.

Help Received
Borrowed gram scale from school.