



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Loren Newton	Project Number S0317
Project Title Loads On Roads: Loading for Safety and Efficiency on Roads	
Abstract Objectives/Goals My objective was to investigate the load placement of our vehicles, so as to ensure safety and efficiency in driving up and down, over bumps and dips on roads. This project was prompted by my concerns over the bumps and dips on roads that caused drivers to lose control so readily; as well as my curiosity over the loading of weight that might cause loss of the vehicle balance. Besides, during the course of my research, I found no analysis on the effects of different centers of gravity (CG) upon objects moving on inclines and declines.	
Methods/Materials First, I constructed a model roadway with 9 different settings of bumps and dips, and recorded the time taken for the R/C vehicle, with 9 different load placements, to travel at a constant speed for a fixed distance. I also observed and recorded the frequency that the vehicle went airborne. Then, I derived from vector diagrams and constructed an adjustable vector model to analyze and explain how and why the resultant force (driving force altered by various settings of rises and drops) behaved under the different center of gravity (by the placements of weight).	
Results My test data showed that, in general, it took shorter time while also presenting higher tendencies to send the vehicle off the ground, to travel over bumps than dips, with weight on back than on front, and with weight on low than on high. From my experiment results, I made a new concept discovery and an in-depth attempt to justify the assertion that high CG is better for uneven roads, scientifically and mathematically.	
Conclusions/Discussion 1. Bumps accelerate the drive and tend to cause loss of control, and therefore it is more critical to level bumps than to fill dips. 2. While low CG is faster for moving forward on flat roads, high CG proved to be more stable for uneven roads.	
Summary Statement To investigate the placements of different centers of gravity affect driving over bumps and dips on roads.	
Help Received My dad helped shop for material and supervised use of power tools during construction and configurations of my experiments. My mom helped with the board presentation.	