



CALIFORNIA STATE SCIENCE FAIR 2014 PROJECT SUMMARY

Name(s) Kishan M. Ghadiya	Project Number 34251
Project Title Does Jupiter Harm or Protect the Earth?	
Objectives/Goals Objective: to use Jupiter and asteroids data in relation to asteroids to find theoretical occurrences of asteroids in the solar system assuming Jupiter did not exist, therefore eliminating Kirkwood Gaps in the Semi-Major-Axis Distribution Histograms. I am to perform statistical inference tests to find the probability that asteroids occurred by chance alone, removing or including any influence of Jupiter on asteroids in my conclusion. Hypothesis: NEO object asteroid occurrences would happen randomly, therefore eliminated Jupiter as a reason for asteroid occurrence Abstract Methods/Materials Materials: Computer, Graphing Calculator, Spreadsheet Program (Excel) and Internet Access. Procedure: From many database websites, I first downloaded and cross-referenced many population distributions of all recorded asteroids in the solar system to create a final population distribution of over 620,000 asteroids and then plotted the population distribution on a histogram. I took the distribution and eliminated values of the 4 Kirkwood gaps and replaced them with theoretical values calculated from 5 linear regression lines of the highest R-squared value. I took a sample of 865 asteroids from the population distribution and set them aside as a separate distribution. I performed a statistical significance test of the sample to infer conclusions of the population distribution. My results will consist of two probabilities that represent the probability asteroids occurrence happened by chance. Results The probability of the first significance test of the original population distribution was 1.345×10^{-85} . The probability of the second significance test of the theoretical population distributions was 1.71×10^{-90} . Confidence Intervals: I am 99.99% confident that the true mean value of asteroids Semi Major Axes will lie in between 1.4 AU and 1.9 AU. Conclusions/Discussion Because both probabilities are considerably small, and therefore relatively equal, it is safe to say my hypothesis was INCORRECT. My hypothesis stated, essentially, Jupiter played the only role in the occurrence of asteroids in Earth's space and removing Jupiter's influence (Kirkwood Gaps) would show that if any asteroid were to appear, then it would do so solely by random chance. However, both probabilities are the same and therefore show that another force besides Jupiter's is acting upon asteroids in the solar system.	
Summary Statement Alleging Jupiter did not exist, my project, by performing statistical inferences tests with NEO data to calculate probabilities of asteroid occurrence by chance alone, proves whether Jupiter's gravitational force indirectly harms Earth.	
Help Received Father helped with the display of project board and spreadsheet programming formulas.	