



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Laurel A. Kroo	Project Number J0623
Project Title Earthquake Mathematics: Fact and Friction	
Abstract Objectives/Goals The purpose of my project is to study how likely it is that a large earthquake will strike, compared to how likely it is for small, or medium size earthquakes to happen. This sort of information will not predict when the next earthquake will be, but rather what is the probability that a certain size earthquake would occur. My objectives in this project are to find these probabilities, and to reproduce this data in several experiments. These tests show me some similarities between static friction and plate tectonics. Methods/Materials The design of my experiment was fairly simple. I measured how much weight it took to start a brick moving against another brick. Static friction is the physical characteristic that both my experiment and earthquakes share. I measured the force needed to move the brick dozens of times. I took three sets of data, each more accurate as I slowly improved my apparatus. After this, I put weights on top of the brick, to see how this would affect the data. Results I sorted the points from least to greatest magnitude, and divided them into #bins#. Each bin contains all the points within a certain range. The numbers of entrees in the bin are then plotted against the average magnitude of the bin. I first plotted data from the USGS website, (10,000 points in about three months in California). To understand and analyze this data I needed to look at the shape of the plot. The data followed almost a perfect power law curve. I then graphed my experimental data and found that this data also follows a power law curve, particularly in the tail. Conclusions/Discussion In the end, I found that the data from my experiment and the data from the real earthquakes looked very similar. I'd like to continue to learn about the mathematics and mechanics of earthquakes. To me, earthquakes are fascinating and I think that someday scientists will be able to unravel the mystery around their prediction. We can do this by improving our understanding of earthquake physics and learning more about these powerful movements in the earth.	
Summary Statement This project involves finding probabilities of earthquake magnitude and reproducing these results in an experiment.	
Help Received Father helped with general discussions about the topic and ideas about statistics; Mother helped paste up board.	