



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Katarina A. Cohen	Project Number J1406
Project Title Mathematical Properties Found in Nature	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to discover if patterns in Pascal's triangle could be found and identified in nature.</p> <p>Methods/Materials To begin my exploration I needed many Blank Pascal's Triangle sheets, graph paper, original Pascal's Triangle on paper, calculator (if necessary), graph of the digital roots of Pascal's Triangle by row, graph of EKG readings, graph of a seismogram reading of an earthquake and graph of sound waves. I graphed the digital roots in Pascal's Triangle. I then compared this graph to the graphs on EKG readings, seismogram readings of an earthquake, and sound wave graphs. I looked for the similarities between each graph. I then used the blank triangles and shaded in specific numbers like all odd numbers, all even numbers, and multiples of 2,3,4, and so on.</p> <p>Results My results showed that my graph of digit roots had a correlation between the rates of increase and decrease with the EKG graphs, sound wave graphs, and seismogram readings of earthquake graphs. One of the most useful patterns in my findings was the Fibonacci Numbers. These numbers can form a swirl that is found almost every in nature. A common pattern I found was one of symmetry.</p> <p>Conclusions/Discussion I figured out that Fibonacci Numbers are also a pattern within Pascal's Triangle. I came to learn that these numbers form a pattern, a swirling line, which can be found in nature. I printed out Pascal's Triangle multiple times and colored in different number patterns. I saw that the patterns that emerged when I did this and noticed the symmetry in them. I also realized that symmetry is found in nature. I had found two ways in which patterns in Pascal's Triangle can be related to nature, thus supporting my hypothesis.</p>	
Summary Statement My project is about discovering patterns in Pascal's Triangle that can be found and related to patterns in nature.	
Help Received My mother encouraged me to do a project about mathematics because she knows it is one of my passions.	