



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Arpi S. Emirzian	Project Number S1206
Project Title Music, Beethoven, Symphonies... MATH?	
Objectives/Goals The objective of this project is to discover if a mathematical pattern can be derived from the repetitive patterns in Beethoven's Fifth Symphony. I hypothesize that if a pattern appears constant, then I can arrive at some kind of mathematical pattern among the successive notes.	
Abstract	
Methods/Materials Using Beethoven's Fifth Symphony (Transcribed for the Piano by Franz Lizst), in Microsoft Works Spreadsheet, I went through each measure and entered the frequency value of each note under "Frequency" (Column B), the count of how long each note was held according to the time signature under "Duration" (Column C), and the difference of the frequencies continuously under "Frequency Change" (Column D). When the "Sequence" (Column A) reached 79, I created a dotted line graph and observed to see if a pattern had formed from columns B, C and D.	
Results The final result was graphs that seemed to show a significant pattern in terms of successive notes throughout sections of the Fifth Symphony.	
Conclusions/Discussion I came to the conclusion that a mathematical pattern does not exist within Beethoven's Fifth Symphony; thought listening to the piece may give the idea that a mathematical pattern may exist within the repetitive chords and sections in the piece. The graphic form of the piece showed no significant mathematical pattern. There were many sources that listed many possibilities of mathematics detected in music. However, to derive the mathematical pattern was no where stated in my research. Each finding was concerned with deriving the frequencies, which I already had.	
Summary Statement I tried to derive mathematical patterns through the constructed graphs of Beethoven's Fifth Symphony.	
Help Received Mr. Platt helped with conclusion of results, Father helped construct board.	