



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Benjamin D. Holtz	Project Number J1209
Project Title What Patterns Are Formed When Number Sequences Are Translated into Different Base Systems and Interpreted in Base-10?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of my project was to find and study patterns formed through the translation of the first thirty terms of figurate number sequences into bases-2 through 20 when the results of these translations are interpreted in base-10. I hypothesized that I would find patterns related to the original sequences.</p> <p>Methods/Materials An iMac AppleWorks spreadsheet application's base translator, pencil, and paper were used. The sequences were entered into the spreadsheet, creating a chart for each sequence and its translations from base-2 through 20. For each sequence studied, the chart was scanned for patterns formed across many or all of the base systems.</p> <p>Results Overall twenty different patterns were found that demonstrated connections between bases. Most of the patterns created were related to the sequences that created them. Many patterns were related to each other even when the sequences that created them were different.</p> <p>Conclusions/Discussion This study demonstrates the relationship between the laws of place value in base number systems and the functions that produce the sequences. Many of the patterns are explainable in mathematical terms, as discussed further in this study. Future investigation may involve translation of longer or more complex sequences into higher bases and/or the use of a computer program to search for patterns.</p>	
Summary Statement This project explores the mathematical relationships between number sequences and patterns formed by their translation into multiple base systems.	
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