# CALIFORNIA STATE SCIENCE FAIR
# 2004 PROJECT SUMMARY

| **Name(s)** | **Project Number** |
|---|---|
| Christopher L. Chiccone | **S1203** |

**Project Title**

## Radical Obsession


**Abstract**

**Objectives/Goals**

The objective of this report is to explain and present a pattern of numbers that I found, involving radicals and Pascal's triangle. My goal is also to validate and interpret the meaning of my original convergence. I also hope to find other alternative patterns that relate to my theory through research.

**Methods/Materials**

While taking this convergent pattern for example: (1/1, 3/2, 7/5, 17/12, 41/29, 99/70, 239/169, 577/408, 1393/985, 3363/2378 . . . , you can see that the next numerator is made by multiplying the previous denominator by 2 and then adding that number to the previous numerator. The next denominator is made by simply adding the previous numerator and denominator together. This pattern converges to the square root of 2. I then developed a recursive formula that encompassed all numbers and variables. For a/b; (an-1+xbn-1)/(an-1+bn-1).

Materials:

TI-83 Plus Silver Edition Graphing Calculator

TI-83 Plus Computer Link and Program

Math CAD 2001i Professional

**Results**

As I continued my research I found that my pattern is closely related to Pascal#s triangle. Also while using this equation I can put any value I want in for x and receive the square root of that number without touching the radical symbol on my calculator. I discovered that my equation could be the basis of how square roots were developed.

**Conclusions/Discussion**

This convergent pattern is a simple formula and it#s just a matter of following the principles of Algebra that led me to discover all of the details. I later learned through recent research that my expression is related almost exactly to the commonly known way of finding square roots and that#s through continued fractions. My pattern also relates to a method discovered by Newton involving the derivatives of a parabola that eventually converge to the square roots of numbers.


**Summary Statement**

To show a method that I created which reveals the basis of how square roots could have been developed.


**Help Received**

Dr. Fletcher, the chairman of Civil Engineering at the University of the Pacific, helped with continued research, along with Steve Gallo, math professor at the University of the Pacific and San Joaquin Delta College.