CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
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Project Number
J1323

Project Title
Spirolaterals: Math Is Art

Abstract

Objectives/Goals
The purpose of this experiment is to find number patterns in spirolaterals.

Methods/Materials
Although spirolaterals can be drawn by hand using a ruler and protractor, it is tedious, time consuming, and error prone. Instead a computer program was used to drawn spirolaterals using the following variables:

X = line length
b = turning angle
Z = number of turns
R = number of repetitions

Results
The following patterns were observed:

1) If b * Z = 360 the spirolateral will not close.

2) The number of repetitions to close a spirolateral is 360/ b * z if b * Z equals a factor of 360.

3) Spirolaterals with turning angle values of b and 360 - b will look the same, just flipped.

Conclusions/Discussion
My original hypothesis was that if b was a factor of 360, the spirolateral would be closed because there are 360 degrees in a circle. Having b be a factor of 360 does not make it closed, but rather when b * Z = 360 the spirolateral was not closed.

It is possible to predict how many repetitions it will take to close a spirolateral: R = b * Z/360. However, it is only true when b * Z is a factor of 360.

Spirolaterals with turning angle values of b and 360 - b will look the same, just flipped. This is because b is the inner angle and 360 - b is the outer angle. An example of this is when b = 144 and b = 216 (360 - 144 = 216)

Summary Statement
The purpose of this experiment is to find number patterns in spirolaterals.

Help Received
My mom for helping me find the computer program and editing; Jerry LeVan, Eastern Kentucky University for the computer program that generates spirolaterals; Robert J. Krawczyk, Illinois Institute of Technology, College of Architecture for the paper "Spirolaterals, Complexity from Simplicity"