CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
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Project Number
S1209

Project Title
Seeking the Center: Centripetally Accelerating Pi

Abstract

Objectives/Goals
There are three objectives in this project. The first is to derive an expression for Pi using the concept of centripetal acceleration. Knowing that the Pi Associates are all the other roots, beside Pi, of an infinite polynomial, the second goal is to investigate the nature of the Pi Associates. And the last objective is to derive expressions for Pi by approximating the areas of definite integrals.

Methods/Materials
If a body is acted upon by centripetal acceleration, you can visualize that the body is constantly falling toward the center, but never reaches it. Since it can be shown that the fall distance is proportional to Pi, we can equate this to a value found for the fall distance through geometric means. This allows me to derive a recursive d expression using the concept of centripetal acceleration. To find the nature of the Pi Associates, one must find all of the finite Pi Associates. All of the other Pi Associates would be unbounded. To approximate the areas of definite integrals is to approximate the area under the curve of a function. We can do this by fitting rectangles under the curve and finding their areas. The smaller the rectangles are, the more accurate the approximation will be. This is represented as an infinite process.

Results
I was able to derive an expression for Pi from the concept of centripetal acceleration. When I investigated the Pi Associates, I found that the only finite Pi Associate is #d, and all the rest are unbounded. I did derive some expressions for Pi by approximating the areas of definite integrals.

Conclusions/Discussion
Although I have derived an expression for Pi from the concept of centripetal acceleration, I still believe there is so much more to be investigated in that area. I was hoping that there would be more finite Pi Associates, but the only Pi Associate is - d. In the future I plan to investigate more definite integrals. I also plan to continue my investigation of Pi and also derive expressions for Pi by approximating the surface area and volume of a sphere.

Summary Statement
This project was done to derive an expression for Pi from the concept of centripetal acceleration, investigate the Pi Associates, and derive expressions for Pi by approximating the areas of definite integrals.

Help Received
My father has been by me through many sleepless nights, helping me with tedious cutting and pasting that is involved with making a board. He made sure I was equipped with supplies I needed, and took me to the library for research. My brother helped with computer simulations. He also helped remove a virus from