CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
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Project Number
29327

Project Title
A Study of Dandelin Spheres: A Second Year Investigation

Abstract

Objectives/Goals
The purpose of this investigation is to see if there is a relationship that forms between the radius of the smaller dandelin sphere to the tangent of the angle RLM and distances that form inside the ellipse.

Methods/Materials
I investigated a conic section of an ellipse that contained two Dandelin Spheres to determine if there was such a relationship. I used the same program as last year, Geometer's Sketchpad, to generate measurements of last year's 2D model of the conic section so that I could better investigate the relationship. After slicing the spheres along the central pole, I looked to see if there were any patterns or relationships. To do this I set the radius of the smaller circle (sphere in 3-D) to 1.09 cm. I changed the radius by .05 cm every time while also noting how the other segments changed or did not change.

Materials
-Geometer's Sketchpad
-Calculator
-Computer
-Paper
-Pencil

Results
After looking through the data tables I noticed that the radius had the same exact values as (a+c)(tan(1/2) angleRLM), where (a+c) is the distance located in the ellipse. I also noticed that the ratio of the (radius)/(a+c) had the same values as tan((1/2 angleRLM)). I figured that this would be true because the tan (theta)=(opposite)/(adjacent) which in this case would be tan ((1/2 angleRLM)) = (radius)/(a+c).

Conclusions/Discussion
Based on my research with previous experiments involving the spheres I proved that the radius of the sphere r(s) will equal (1/2tan)(a+c), where (a+c) is the distance located in the ellipse. This is only true when the ratio of r(s)/(a+c) equals (1/2tan).

r(s)=tan(1/2theta)(a+c) which is only true when tan(1/2theta)=(r(s))/(a+c).

Summary Statement
To find the relationship that forms between a dandelin sphere's radius to an angle formed by an ellipse.

Help Received
Teacher proofread my project