



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Ben Ackerman	Project Number J1301
Project Title Thinking in Semicircles: The Area of an Arbelos	
Abstract Objectives/Goals The purpose of this experiment was to prove that the area of an arbelos is equal to the area of a circle whose diameter is the altitude of a right triangle drawn to the hypotenuse, which is inscribed in a semicircle. The experiment involved creating a mathematical proof using the knowledge of various geometry theorems and postulates, and applying them to the diagram in order to create accurate formulas for both areas. The history of Geometry and the format for a mathematical proof are discussed. Methods/Materials The materials to construct the diagram used for this proof include a pencil, a ruler, and a compass. The area of the arbelos was found by subtracting the areas of the two smaller inner semicircle from the larger one. The diameter of the circle, which was also the altitude drawn to the hypotenuse of a right triangle inscribed in the larger semicircle, was found using the theorem, which states that the altitude drawn to the hypotenuse of a right triangle is the geometric mean of the two segments of the hypotenuse. By dividing the altitude, or the diameter, in two, the radius of the circle was found, thus making the area of the circle possible to calculate. Once the dust settled, the two formulas for the areas were equal. Results The proof held true. Once the areas of the arbelos and the circle were calculated they were equal. Conclusions/Discussion In conclusion, both areas when found were equal.	
Summary Statement A mathematical proof was constructed to determine whether the area of an arbelos is equal to the area of a circle, whose diameter is the altitude of a right triangle drawn to the hypotenuse inscribed in a semicircle.	
Help Received My mother helped me use spray mount to put my board together.	