Magician and the Moon

Brief Description:
The Magician and the Moon exhibit deals with covering a circle with five smaller circles.

Objectives:
This covering problem is a fun challenge involving the area of circles. Students can discuss their strategies for solving this problem, and then use hands-on exploration to discover the counter-intuitive solution.

Links to Websites:
http://mathmidway.org/Training/moon.php

http://demonstrations.wolfram.com/TheCircleCoveringPuzzle/

Vocabulary:
Area of a circle   Circumference
Diameter   Pi
Radial symmetry   Radius

Before:
- ⊙ (*Levels 1, 2*) It's an interesting activity to cover a circle with six smaller circles. It can be done on paper with a compass.

- ⊙ (*Levels 2, 3*) Given three congruent circles, arrange them in such a way as to cover the largest possible fourth circle.

During:
- ⊙ (*Levels 1, 2, 3*) Have your students solve the problem of covering the white circle with 5 smaller circles. For a hint, you can first tell them that the answer is not completely symmetric. As a second hint, note that the outer points where overlapping magnets touch each other all sit on the circumference of the big circle.

After:
- ⊙ (*Levels 1, 2, 3*) Examine other covering problems online. Download the free Mathematica Player and try other covering problems here:
  http://demonstrations.wolfram.com/TheCircleCoveringPuzzle/

- ⊙ (*Levels 2, 3*) *Investigation:* Consider the relationship between the measure of the radius of the big circle and that of the small circle.