## Geometric Dartboards

ID: 8269

Name _____

Class _____

In this activity, you will explore:

- *Creating geometric dartboards*
- *Using theoretical and experimental probability to determine the scoring rules for your dartboard*

Open the file *GeoAct02_GeomDartboards_EN.tns* on your handheld and follow along with your teacher to work through the activity. Use this document as a reference and to record your answers.

Step 1: On page 1.2, you are shown a rectangular shape that will be your dartboard. Using the Shapes menu, place a **Circle**, **Triangle**, **Regular Polygon** of your choice, and an irregular **Polygon** of your choice. Make sure none of your four shapes overlap. Sketch your dartboard on the screen to the right.
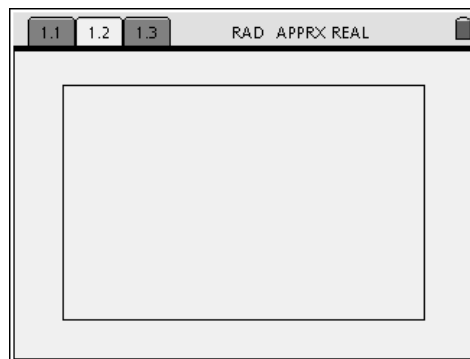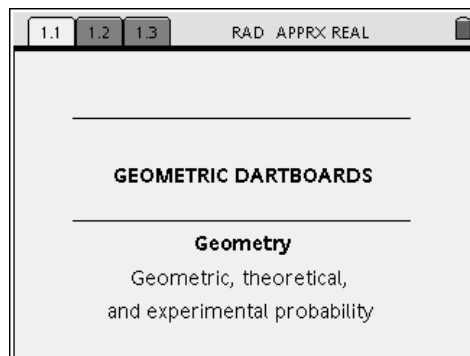
Step 2: Once you have your shapes created, measure the **Area** of each shape and move the measurements outside the rectangular area. Also measure the area of the dartboard (the big rectangle). Assign variables to each of the areas. To do do, click on the measurement, press (stor/Var), select **Store Var**, type in a variable name, and press (enter). Using the **Hide/Show** tool, hide all of the vertices and center points of your shapes.

Step 3: Record you areas in the table below. To find the outside area, subtract the areas of the shapes from the total area of the rectangle.

Results Table

Shape	Triangle	Circle	Regular Polygon	Irregular Polygon	Outside
Area					
Theoretical Probability					
Experimental Probability					

Step 4: Using the *Calculator* application on page 1.3, you can use the variables assigned to each area value to calculate the theoretical probability of a "dart" hitting each shape on your dartboard. Do not forget to include the space outside your four shapes. Enter these results in the table in Step 3.

Step 5: After you have your theoretical probabilities calculated and recorded, you will set up the handheld to simulate "throwing darts" at your dartboard.

On page 1.3, use the function **RandSeed** with the last four digits of your phone number to set the device to return random integer values.

Next, use the commands **RandInt**(–20, 20, 100) → *xco* for random *x*-values and **RandInt**(–12, 12, 100) → *yco* for random *y*-values that will be used as the coordinates of the darts.

Step 6: On page 1.2, select **Scatter Plot** from the Graph Type menu. Set up a scatter plot choosing the variables **xco** for the *x*-values and **yco** for the *y*-values. The darts will now appear on the dartboard. Then press ⏚ + ⓖ to hide the Entry Line.

Step 7: Count the number of darts that landed inside each of the shapes. Record these experimental probability results in the table in Step 3.

Step 8: Using all the data you have collected, create a scoring system for your dartboard. Write a paragraph outlining your scoring system and justify it with your probability analysis.

Extensions

1. Repeat Step 5 to generate yet another set of 100 darts. Does your experimental probability remain the same or differ? Does your scoring system still make sense with these new results?

2. With a partner, take turns throwing 10 darts at your dartboard and your partner's dartboard. Find out who got the better score!