

## Maximize the Area of a Basketball 'Key' Gift 4.4

This activity is to be done along with the Nspire CAS file of the same name.

You have 100 feet of fence to enclose this shape, made up of a rectangle and a semicircle. You need to configure this shape so that the area of this region is a maximum.

Show the work on your paper and in the Nspire document. Clearly indicate your work. Let the CAS do the calculations. Use *radius*, *height*, *base*, and *area* as variable names.

Find the radius, height, base, and maximum area -- as exact answers and rounded to 3 decimal places. Store all intermediate results and use those results in your calculations. Do not use any rounded values to calculate answers.

Use as many pages in the Nspire document as necessary. Just try to make it easy for the reader to follow your logic and work. Note on your paper any necessary information to assist the reader in understanding your solution.

**For the following, please number your responses on your paper. Also make sure that the Nspire file has supporting work for your answers.**

1. List all variables and functions along with their definitions on your paper.
2. State the radius, height, base, and maximum area -- as exact answers and rounded to 3 decimal places.
3. Algebraically find the answers to the following questions using CAS:
  - a) Find the value of the area of the region if the radius is 10 feet. Also find the base and height when the radius when the radius is 10 feet. Round to 3 decimal places only. No exact values needed here.
  - b) Find the value of the radius (radii) that creates an area of 400 square feet. Also find the base(s) and height(s) when the area is 400 square feet. Round to 3 decimal places only.
4. Create a graph page with an appropriate window that illustrates the graph of the *area* function.
  - a) Record the window on your paper.
  - b) Justify your answers on the graph to questions 2, 3a, and 3b. Label the ordered pairs on the graph screen so that we can see that they do in fact justify these answers.

**NOTE:** Make sure that you save the file on your Nspire handheld unit. That file will be collected and graded along with your paper.

