Fencing the Dog Yard

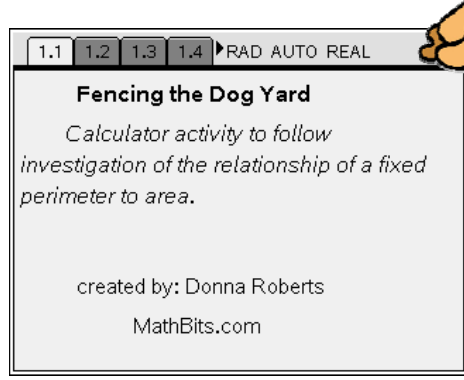
TI-Nspire Investigation from MathBits.com

Name________________________________

Directions: Grab your TI-Nspire and read carefully!

1. Get the **dogyard.tns** file loaded onto your TI-Nspire.

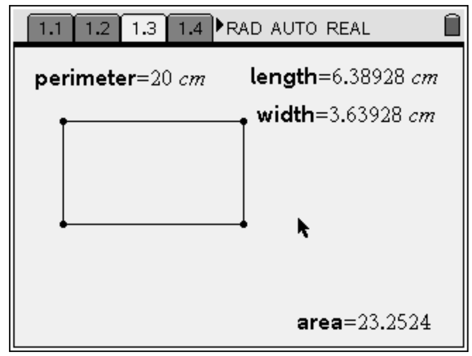
Open the document **dogyard.tns**



2. On page 1.3 you will see a rectangle with a **fixed** perimeter of 20 cm, which will simulate your paper clip fencing.

Grab and drag the **lower right vertex** of the rectangle and observe the changes in the length, width, area and perimeter.

Pay particular attention to the changes in the area and the shape of the rectangle.

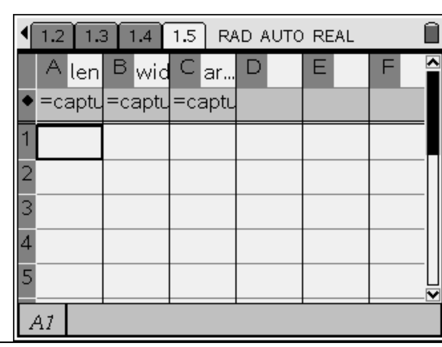


Obsrevation: What appears to be happening to the area of the rectangle as the vertex is moved?

3. You are now ready to start collecting data from the moveable rectangle to further investigate this situation. From your rectangle, on page 1.3, you will now collect data that will be placed in the spreadsheet on page 1.5.

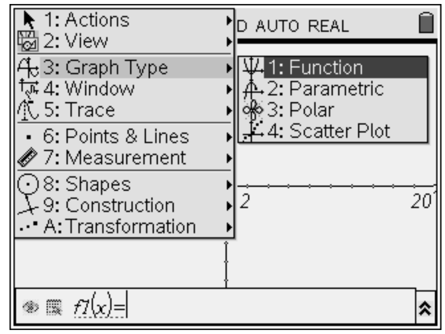
By moving the lower right vertex, place the rectangle in a variety of shapes, and press **"CTRL, period"** after each shape to collect the data. Have a minimum of 10 data collections.

The **length**, **width** and **area** of each of your chosen rectangles will appear in their respective columns in the spreadsheet.



4. On page 1.7, you will create a scatter plot to graph your data.

For a **scatter plot,** choose **Menu, #3 Graph Type** and **#4 Scatter Plot.**

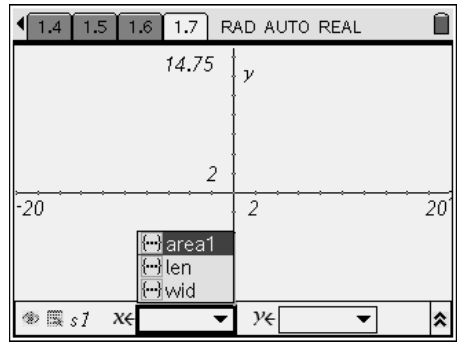


5. Click on the *x* and *y* entry boxes to see the available variables.

Choose the *x*-axis to be **len.**

Choose the *y*-axis to be **area1.**

Hit **Menu – 4 – 9** for **Zoom Data**.

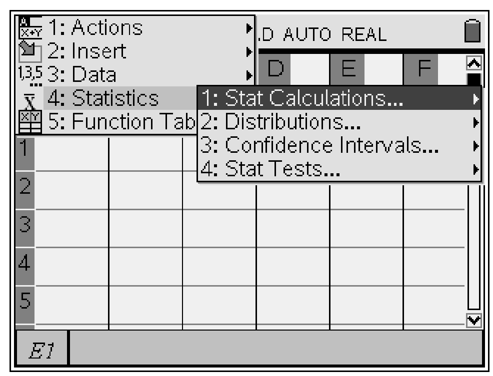


Observation: Does the graph support your thoughts about what was happening with the area? Do you think there will be a maximum area for this problem? Explain.

6. It is time to look at the statistics for this data and obtain a representative model equation (a regression equation). Is this the “name” you chose for your paper clip graph?

Return to page 1.5.
Click a cell in **Column E**.
Choose Menu #4 Statistics, #1 Stat Calculations, #6 Quadratic Regression

Choose X List = len
Y List = area1
Save to….. f1

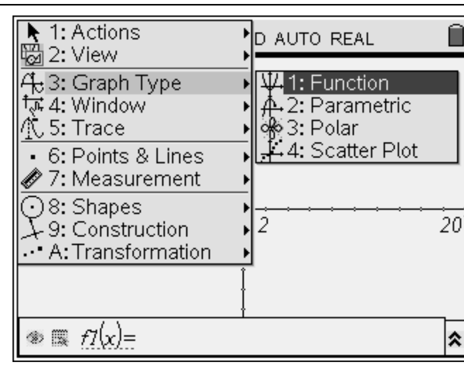


7. Return to the graph, page 1.7.

Choose **Menu #3 Graph Type, #1 Function**

Arrow up to *f1(x)* if it is not visible.

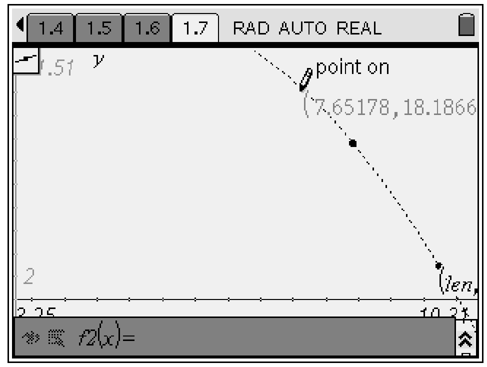
Hit **ENTER.** You will see the graph on top of the scatter plots.



8. Now, let's find that maximum area. We need a point on the graphed line (the points you see are from the scatter plot).

Choose **Menu #6 Points and Lines, #2 Point On** and place a point on the graph. Move to any location, see the pencil, and hit ENTER.

Grab the point. Move the point toward the top of the curve until a capital **M** appears, signifying *maximum.*



Observation: To the nearest hundredth, that is the maximum possible area of the dog yard?

What are the dimensions that create this dog yard? State both length and width.

Conclusion: Would the dog yard of maximum area be the BEST shape for the dog yard? Explain your answer, listing factors that would affect your decision.

Comparison: When you built the dog yard with the paper clips, you used only integer values for the lengths of the sides of the pen. At the bottom of your table (chart) for that activity, you represented the length, width and area in terms of *x*. Plot the area you listed in that table onto page 1.7 along with your other graphs.

How does that initial equation compare with the quadratic regression equation?

Explain why you did not get the "exact" (best fit) equation using the paper clips.