Fencing the Dog Yard Name TI-Nspire Investigation from MathBits.com Directions: Grab your TI-Nspire and read carefully! 1. Get the dogyard.tns file loaded onto your TI-Nspire. √ 1.1 1.2 1.3 ► *dogyard ▼ Fencing the Dog Yard lΙΥ Open the document dogyard.tns Calculator activity to follow investigation of the relationship of a fixed perimeter to area. created by: Donna Roberts MathBits.com 2. On page 1.3 you will see a rectangle with a fixed <1.2 1.3 1.4 ► *dogyard ▼ A 10 perimeter of 20 cm, which will simulate your paper clip perimeter=20 cm length=6.39 cm fencing. width=3.64 cm Grab and drag the **lower right vertex** (the point) 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. area=23.3 3 **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. < 3 1.4 1.5 ► *dogyard ▼ A 10 A len wid ^{l∎}area1 =captu =captu =captu The length, width and area of each of your chosen rectangles will appear in their respective columns in the spreadsheet. 4 5

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| 4. On page 1.7, you will create a scatter plot to graph your data. | Nard 	 ∰ Xard 	 ∰ Xard 	 ₩ Xard 	 ₩ |
|---|---|
| | 4: 3: Graph Type → ₩ 1: Function ↓ 4: Window / Zoom → 4 2: Parametric |
| For a scatter plot, choose Menu, #3 Graph Type and #4 | /戊 5: Trace → 🚱 3: Polar 😼 6: Analyze Graph → 🚅 4: Scatter Plot |
| Scatter Plot. | 7: Poirts & Lines ↓ 🖳 5: Sequence ↓ |
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| | S ¹ _{ν←} S ¹ |
| 5. Hit Var: Choose the <i>x</i> -axis to be len. | 1.6 1.7 1.8 ▶ *dogyard ▼ |
| Hit Warry Change the specie to be arrest | 6.67 V |
| Hit Var: Choose the <i>y</i> -axis to be area1. | |
| Hit Menu – 4 – 9 for Zoom Data. | |
| | -10 1 10 |
| | , i i i i i i i i i i i i i i i i i i i |
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| | ⊛ s1 (ν ← γ ⊗ |
| Observation: Does the graph support your thoughts about | |
| you think there will be a maximum area for this problem? If | Explain. |
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| | |
| 6. It is time to look at the statistics for this data and obtain | |
| a representative model equation (a regression equation). | स्न 1: Actions →, *dogyard ❤ 🕷 🗵 |
| Is this the "name" you chose for your paper clip graph? | 135 3: Data ● area1 ■ ■ F ▲ ▼ 4: Statistics ● 1: Stat Calculations ● |
| Return to page 1.5. | 🛱 5: Table 🔸 2: Distributions 🔹 🔸 🔤 |
| Click a cell in Column E . | G: Hints G: Hints 4: Stat Tests |
| Choose Menu #4 Statistics, #1 Stat Calculations, #6 | |
| Quadratic Regression | 3 |
| | |
| Choose X List = len | |
| Y List = area1 | E1 🔍 |
| Save to f1 | |
| 7. Return to the graph, page 1.7. | ▶ 1: Actions 2: View |
| Choose Menu #3 Graph Type, #1 Function | 46 3: Graph Type → <mark>₩ 1: Function</mark> 坂 4: Window / Zoom → 本 2: Parametric |
| choose menu #5 Graph Type, #1 Function | /(੮ੈ 5: Trace 🛛 🖬 🖗 3: Polar |
| Arrow up to $fl(x)$ if it is not visible. | / |
| | & 8: Measurement |
| Hit ENTER. You will see the graph on top of the scatter | A: Construction |
| plots. You may need to adjust the window. | B: Transformation C:Hints |
| | (7) C: Hints |
| | -0.0/ ÷ |

| 8. Now, let's find that maximum area. | <1.5 1.6 1.7 ► *dogyard 	 🖅 🕼 🔀 |
|--|---|
| Choose Menu #6 Analyze Graph - #3 Maximum. Move the hand until the Maximum appears. | 40 V (5.01, 25.1) |
| You answer will not, necessarily, be the same as the one shown at the right. | $f1(x) = -1. \cdot x^2 + 10. \cdot x + -2.79 = -x$ |
| | $\begin{array}{c} -10 \\ \hline \\ \odot \end{array}$ $\begin{array}{c} -10 \\ \end{array}$ $\begin{array}{c} 1 \\ 1 \\ \end{array}$ $\begin{array}{c} 20 \\ \end{array}$ |
| Observation: To the nearest tenth, that is the maximum pos | sible area of your dog yard? |
| What are the dimensions that create this dog yard? State both | h length and width. |
| | |
| Conclusion: Would the dog yard of maximum area be the B | BEST shape for the dog yard? Explain |
| your answer, listing factors that would affect your decision. | |
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| Comparison: When you built the dog yard with the paper c | ling you used only integer values for the |
| lengths of the sides of the pen. At the bottom of your table (α length, width and area in terms of x . Plot the area you listed other graph. | chart) for that activity, you represented the |
| How does that initial equation compare with the quadratic re- | gression equation? |
| Explain why you did not get the "exact" (best fit) equation us | sing the paper clips. |
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