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Numb3rs Activities for Algebra Classes
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1. Charlie drops an object and the path of the object's fall is modeled by the data below. Find an equation which models the data where "x" represents the time in seconds and "y" represents the height of the object in feet:

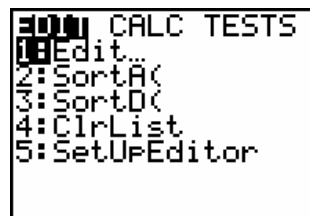
x	0	1	2	3
y	150	134	86	6

Use a system of equations in standard form: $y = ax^2 + bx + c$ and show your work here:

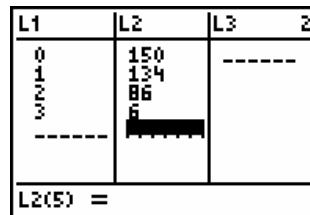
Equation: _____ Next, let's check to see if the equation is correct and let the graphing handheld do the work!

2. Using the graphing handheld, find the quadratic regression that models the data:

A. Press the **Stat** key: the third key in the same row as the green Alpha key: You should see the following:



B. Step 3: Press number 1 "Edit": Enter the data from the table above.

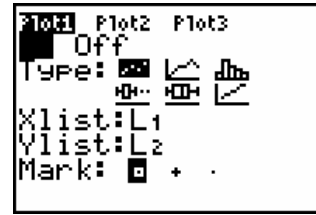


C. Next, press 2nd Y= which is the Stat Plot key:



Press **Enter** twice in order to turn the plots on.

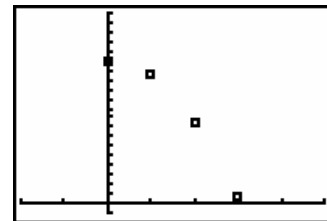
Make sure that the handheld is set for a scatterplot and that the X and Y lists are the locations where the data was entered.



D. Next, find an appropriate viewing window for your data. Be sure that you will be able to see your axes!

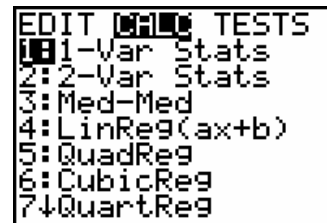
**** Warning**** Make sure that the home screen and the Y= screens are clear before continuing!

E. Press **Graph** and you will see your points plotted:

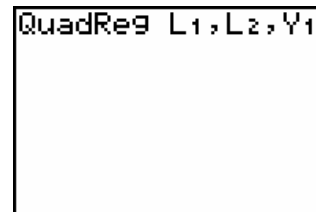


F. Obtain the regression equation. Press **Stat**, then right arrow over to **Calc**.

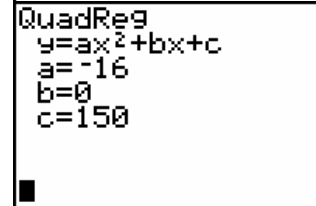
Which regression should we choose? _____
Why? _____



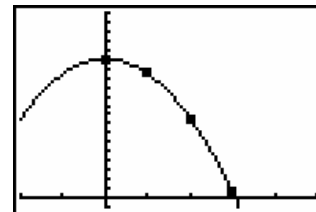
G. Next, tell the calculator which lists (L1 and L2) you used to plot your points. Press 2^{nd} 1 for L1 and 2^{nd} 2 for L2. Next, tell the calculator which y= function you want to paste the equation into. Press **Vars**, right arrow over to “Y-Vars”, and press number 1.



H. Press **Enter** to see the equation.



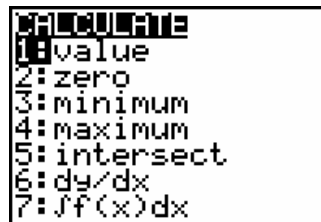
I. Press **Graph** to see the graph of the equation:



3. Define “vertex of a parabola” _____

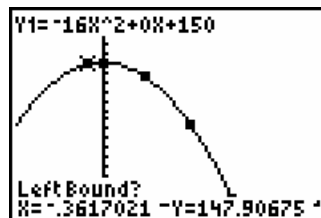
4. What is the vertex of the parabola above?

Press 2nd Calc 4



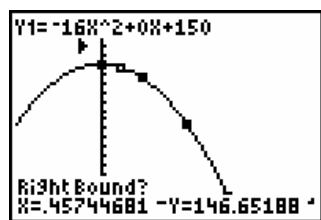
5. Move the cursor so that it is located to the left of the vertex location.

Press Enter.



Move the cursor so that it is located to the right of the vertex location.

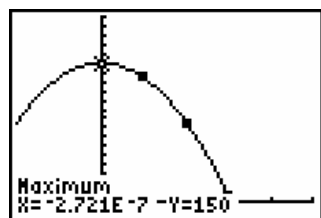
Press Enter.



Move the cursor so that it is located close to the vertex, or enter the x coordinate for your guess.

Press Enter

What does the vertex represent in this example?



6. What are other terms for the x-intercept: _____, _____, or _____.

What does the x-intercept represent in this example? _____

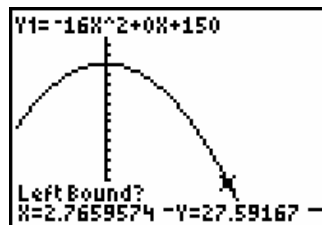
Which x-intercept makes sense for this situation? _____

Why? _____

7. Let's find the x-intercept for this equation!

Press 2nd Calc 2 then follow the same basic steps as in #5. You will position the cursor on the left and then the right side of the x-intercept.

The x-intercept is: _____



8. Another way to write the equation of a parabola is based on its focus and directrix.

This equation can be defined using the conic section form: $(x - h)^2 = 4p(y - k)$

where (h, k) represent the vertex and p represents the distance that the focus and directrix each lie from the vertex.

Using the Conics APP, investigate the equation of a parabola where $p = .25$, $h = 0$ and $k = 0$.

Change the parameters of h . How does the value of h affect the graph of the equation?

PARABOLA

$(X-H)^2=4P(Y-K)$

H=0
K=0
P=.25

ESC

Change the parameters of k . How does the value of k affect the graph of the equation?

Change the value of p . How does the value of p affect the graph of the equation?

If the equation $y = -16x^2 + 0x + 200$ is changed to $(x - h)^2 = 4p(y - k)$ form, what will be the value of p ? _____

If the equation $y = -16x^2 + 0x + 200$ is changed to vertex form $y = a(x - h)^2 + k$, what is the new equation? _____

9. Find equations of a parabola in $y = ax^2 + bx + c$, $y = a(x - h)^2 + k$, and $(x - h)^2 = 4p(y - k)$ forms given the situation below:

