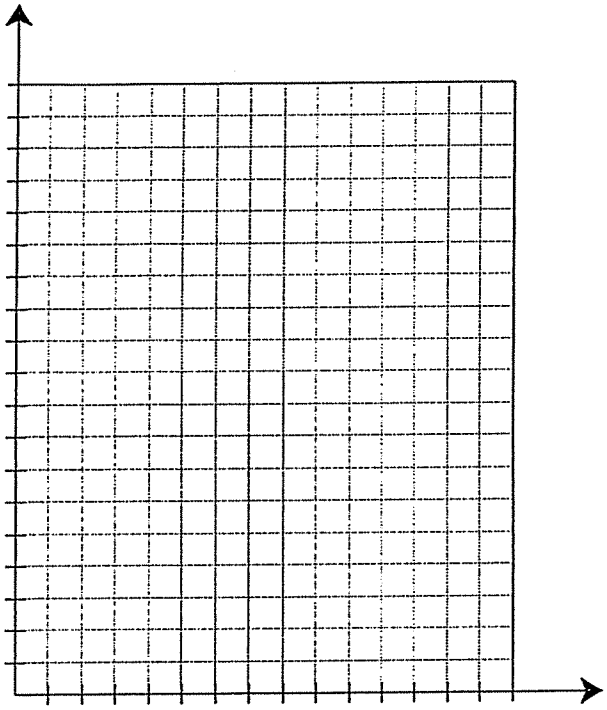
Quadratic Regression Using the Nspire Graphing Calculator

Name: _____

We will use the following data to do a regression equation on our graphing calculator: A golf ball is hit down a straight fairway. The following table shows the height of the ball with respect to time.

Time	0	.5	1	1.5	2	2.5	3	3.5	4	4.5
Height	0	17.2	31.5	42.9	51.6	57.7	61.2	62.3	61.0	57.2

First, let's graph the data by hand:



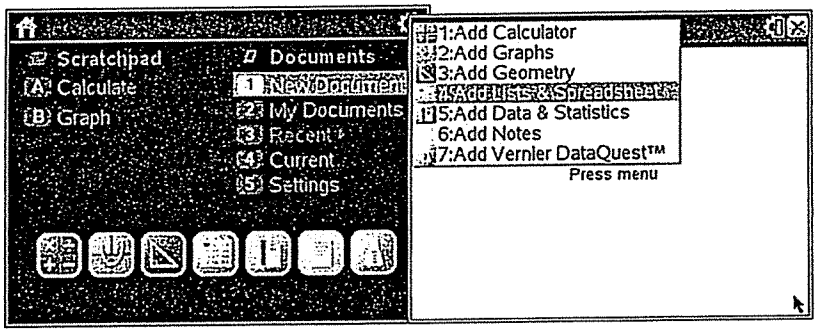
A) What should we label our x-axis and y-axis?

B) Plot the points.

C) Does this appear to be a linear function? Explain.

1) Using the NSpire Graphing Calculator to Enter and Graph Data.

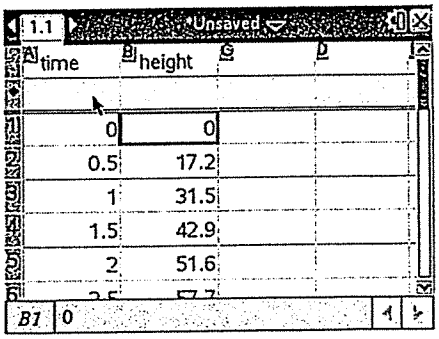
Select 1: New Document
Press Enter.
Select 4: Add Lists & Spreadsheet
Press Enter.



2) Make sure that as you type in the headings of each column you are in the very top part of the columns. Press Enter after each heading is complete. Put the cursor in the first row of the spreadsheet to start entering the data.

Enter all the data from your table.

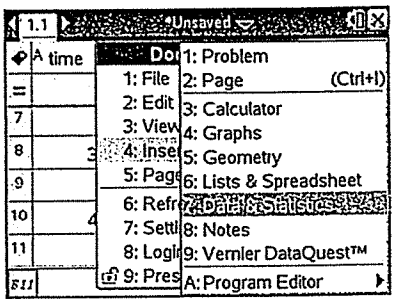
Please Note: You cannot see all the data in the screen shot.



3) Making a Scatter Plot of the Data on the NSpire Graphing Calculator

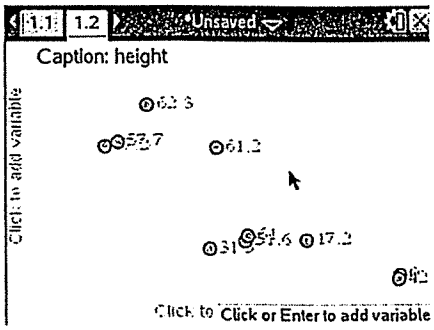
Insert a new page by pressing the Doc Key.

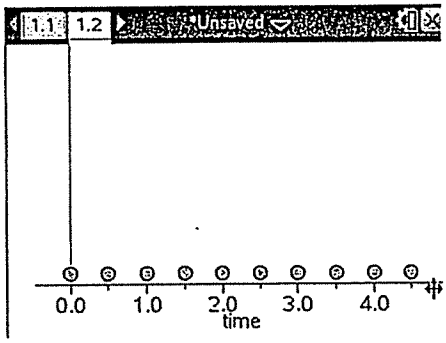
Select 4: Insert
7: Data & Statistics

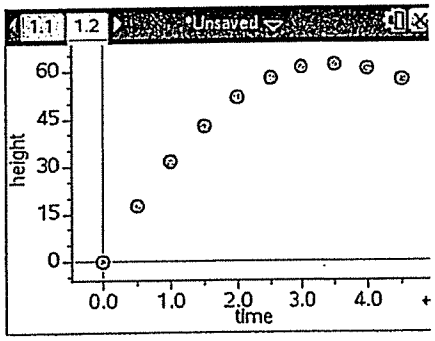


Notice the message at the bottom of the screen and the left part of the screen: **"Click or Enter to add variable".**

Move the cursor to this message on the x-axis. Press Enter. Select time. Press Enter.	Move the cursor to this message on the y-axis. The message may not appear right away until the cursor gets close to it. Select height.	Press Enter.



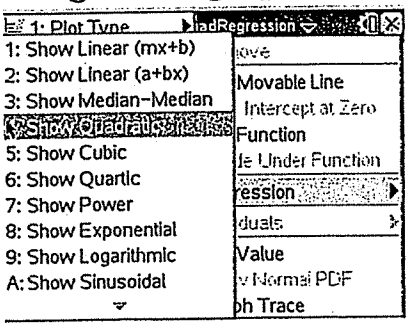




4) What type of function does this appear to be?_____

5) Finding a Regression Equation on the Calculator – showing on the graph

Press Menu.
Select 4: Analyze
Use the right arrow on the Touch Pad and select 6: Regression.
Use the right arrow on the Touch Pad and select
4: Show quadratic
Press Enter.



Write out the calculator's function (round to the nearest thousandth).

_____

6) Using your regression model to make predictions and answer questions about a data set.

When using your modeled function to answer questions you need to pay attention to whether you are given an x or y-value.

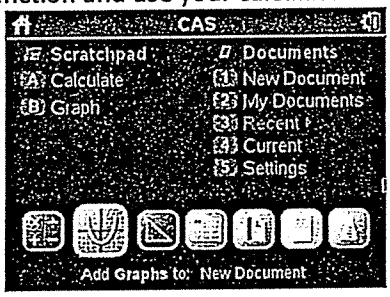
Example 1: Given an x-value

When given an x-value all that you need to do is plug this value into your equation for 'x'.

Find the approximate height of the golf ball after 1.75 seconds have passed.

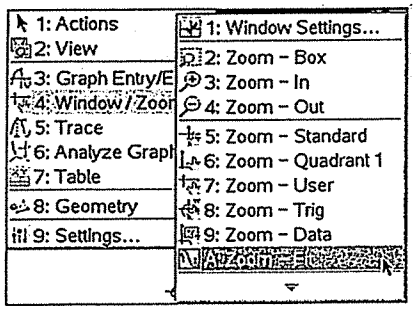
Example 2: Given a y-value

When you are given a y-value you need to graph the function and use your calculator to find corresponding x-values. *There will always be 2 of them!*

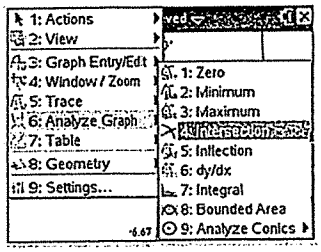


Step 1: Adding a Graph Page
Press the Home (on) button
Select "Add Graphs to: New Document"
Type the equation and press enter
***Do not be alarmed if your function is not present

Step 2: Adjusting your window
Press "menu"
Select "4: Window/Zoom"
Select "A: Zoom – Fit"



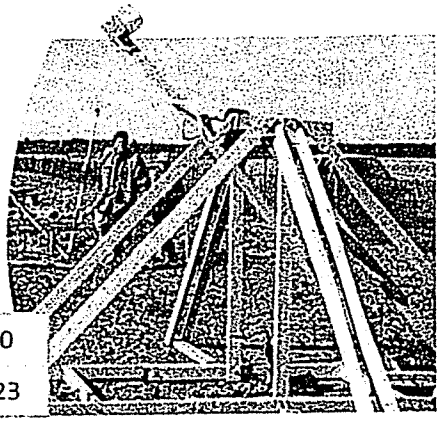
Step 3: Finding the Solutions
Press "Tab"
Type the value given for y and press enter
Press "menu"
Select "6: Analyze Graph"
Select "4: Intersection"
Set your bounds to find the answer!
***There are two intersections so you need to find both...



Find how many seconds have passed if the golf ball is 50 feet in the air.

Alg 2 5.1 Quadratic Regression Applications Name_____

1.) **PUMPKIN TOSSING** A pumpkin tossing contest is held each year in Morton, Illinois, where people compete to see whose catapult will send pumpkins the farthest. One catapult launches pumpkins from 25 feet above the ground at a speed of 125 feet per second. The table shows the horizontal distances (in feet) the pumpkins travel when launched at different angles. Use a graphing calculator to find the best-fitting quadratic model for the data.



Angle (degrees)	20	30	40	50	60	70
Distance (feet)	372	462	509	501	437	323

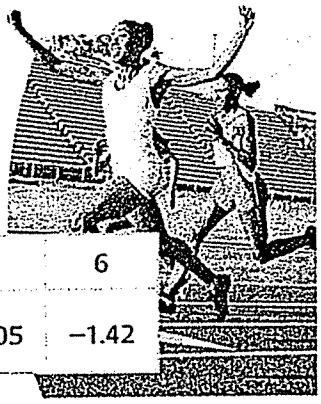
Define variables. x = y =

a) Write quadratic model for the data.

b) Find the distance that a 35^0 angle would produce.

c) Find the angle that would produce a distance of 450 ft.

2.) **RUNNING** The table shows how wind affects a runner's performance in the 200 meter dash. Positive wind speeds correspond to tailwinds, and negative wind speeds correspond to headwinds. The change t in finishing time is the difference beween the runner's time when the wind speed is s and the runner's time when there is no wind.



Wind speed (m/sec), s	−6	−4	−2	0	2	4	6
Change in finishing time (sec), t	2.28	1.42	0.67	0	−0.57	−1.05	−1.42

Define variables. x = y =

a) Write quadratic model for the data.

b) Find the change in finishing time when the wind speed is 10 m/sec.

c) Find the wind speed if the change in finishing time is 1.3

3.) Using a graphing calculator and quadratic regression to find a model:
A study compared the speed x, in miles per hour and the average fuel economy y (in miles per gallon) for cars. The results are shown in the table. Find a quadratic model in standard form for the data.

Speed x	15	20	25	30	35	40	45	50	55	60	65	70
Fuel Economy y	22.3	25.5	27.5	29	28.8	30	29.9	30.2	30.4	28.8	27.4	25.3

Define variables. x = y =

a) Write a quadratic model for the data.

b) Find the speed to travel to obtain 24 mpg.

c) Find the fuel economy if the speed is 42 mph

4.) The table shows how wind affects a runner's performance in the 200meter dash. Positive wind speeds correspond to tailwinds and negative winds corresponds to headwinds. Positive changes in finishing time mean worsened performance (your time is slower) and negative changes mean improve performance (your time got faster).

same as #2

Wind Speed (m/sec) s	-6	-4	-2	0	2	4	6
Change in finishing time t	2.28	1.42	0.67	0	-0.57	-1.05	-1.42

Define variables. x = y =

a) Find the quadratic model for the data.

b) Find change in finishing time when wind speed is -1.

c) Find wind speed when change in finishing time is 1.