Getting Ready For Quadratics

by Patricia Kehoe

Activity overview

This activity is intended as a skill building exercise to familiarize students with TI-Nspire skills they will need for a unit which covers the properties of quadratic functions. The activity includes exercises on creating a scatter plot, finding a curve of best fit, and tracing a function.

Concepts

Identifying key features of a quadratic relation: ordered pairs, scatter plots, curve of best fit, vertex, x-intercept, y-intercept

Teacher preparation

As students work through this activity, the teacher may find it useful to provide students with a hard copy of the steps required to create a scatter plot, find a curve of best fit, and trace a function. This handout could then be used throughout the unit for students who require help remembering the steps involved in using the TI-Nspire handheld.

Classroom management tips

Ideally, each student should have their own handheld. If this is the students first exposure to the TI-Nspire technology it would be beneficial if teachers used the overhead panel or the computer software to walk through the activity with their class.

TI-Nspire Applications

Lists & Spreadsheets: entering data into lists, resizing list widths, finding regression equations
Graphs & Geometry: creating scatter plots from data in lists, graphing equations, resizing window settings, and tracing

Step-by-step directions

See below in Student section

Assessment and evaluation

- *This activity is not intended for assessment as it is a introduction to the TI-Nspire technology.*

Activity extensions

- *Throughout the unit on Quadratics students will be required to use the skills acquired in this activity.*

Student TI-Nspire Document

See below.

by: Patricia Kehoe
Grade level: 10
Subject: mathematics
Time required: 45 to 90 minutes

Materials: TI-Nspire Handhelds and Overhead projection panel

Getting Ready for Quadratics With TI-Nspire

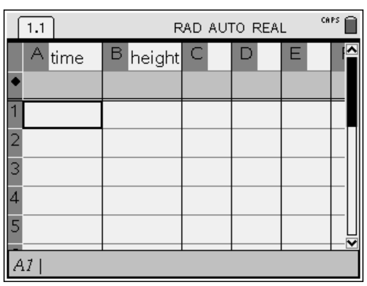
1) Creating a Scatter plot

The relationship shown in the table represents the **height, h metres**, of a fireworks rocket **t seconds** after it is launched.

Follow the steps below to create a scatter plot of this data on your TI-Nspire.

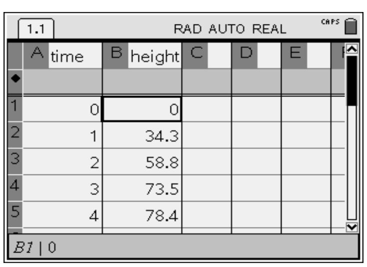
t(sec)	h(m)
0	0
1	34.3
2	58.8
3	73.5
4	78.4
5	73.5
6	58.8
7	34.3
8	0

Press 6 to open a new document and Select **3: Lists and Spreadsheets**. (If you are asked if you wish to save a previous document, just click on "**No**")



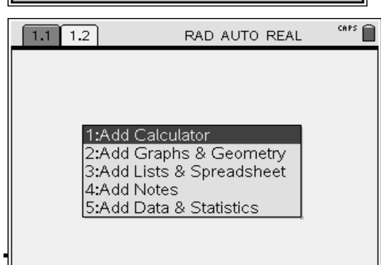
In the first column in the box beside A, type in **time**. Press enter. You will want to re-size the width of the column To resize select menu 1 (for Actions), then 2 (for resize). Adjust size of the column using arrows on the nav pad. Press enter to lock in the width you have chosen. Press esc

Repeat the same process to label Column B as **height**.

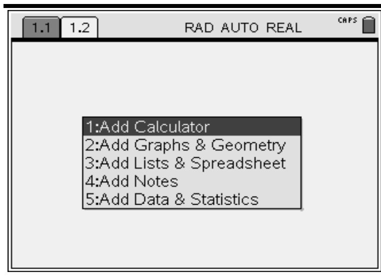


Enter the data from the table provided.

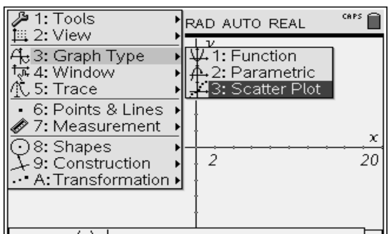
Look in the top left of your screen and notice that you are on page **1.1** in your document.



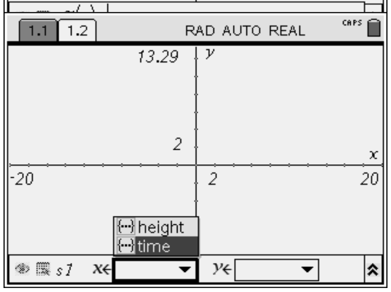
Press ctrl I to insert a new page.
Choose **2:Graphs & Geometry**



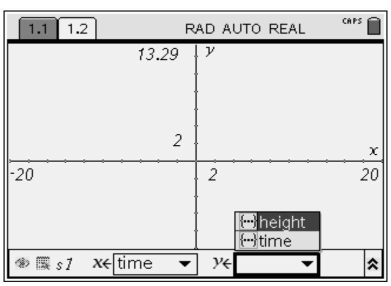
Press ctrl I to insert a new page.
Choose **2:Graphs & Geometry**



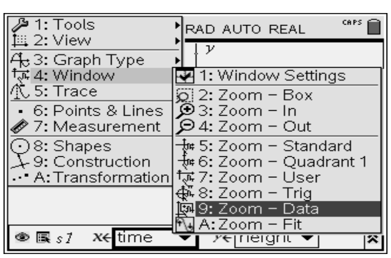
Change your graph type to **Scatter Plot** by pressing menu 3 3.



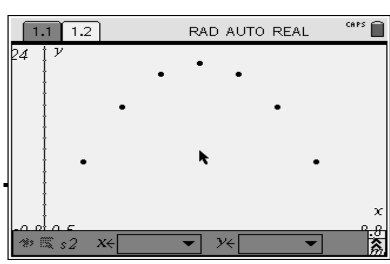
Your cursor will be in the x box at the bottom of your screen. Use the Nav pad to click and select time for your horizontal axis. Press enter and you will see time pasted in the x box.



Press tab to highlight the y box of the scatter plot. Use the Nav pad to click and select height for your vertical axis. Press enter and you will see height pasted in the y box.



You will need to re-size the window so you can see all the points from the table.
Press menu 4 9.



Your scatter plot should now be showing on your screen.

Notice that you are on page **1.2** of your document.

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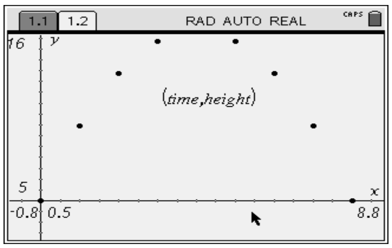
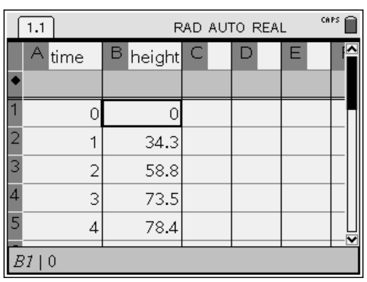
Grade level: 10
Subject: mathematics
Time required: 45 to 90 minutes

Materials: TI-Nspire Handhelds and Overhead projection panel

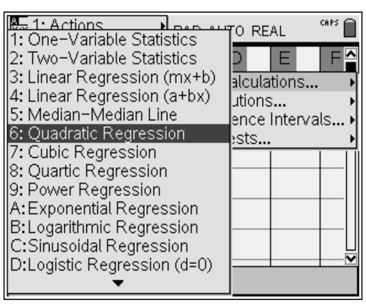


Press ctrl G to enable you to see the horizontal axis.
To grab the ordered pair (time,height) from the bottom right corner of your screen, move cursor on top of it and hold click button down (click). Use nav pad arrows to place it somewhere on your screen. Press esc.

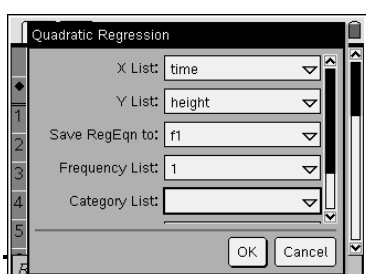
2) Finding a Curve of Best Fit



To go back to the first screen containing your spreadsheet press ctrl **and left arrow** on the nav pad.



Press menu 4 1 6 to select Quadratic Regression

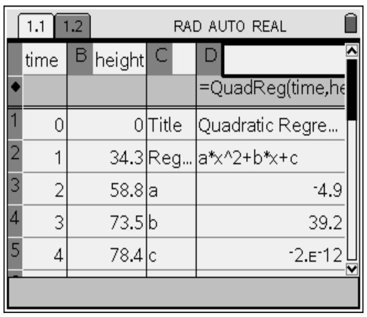


Enter the values shown in the pop-up menu on the left.

To enter each value use the **click** button (click) to make your selection and then press enter. Use the tab key to move from box to box.

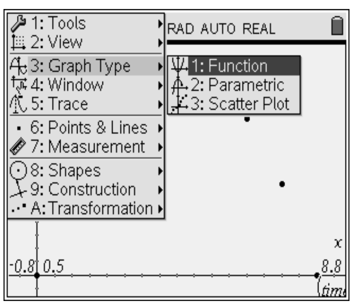
Notice you have saved the equation in f1. That will come in handy when you want to see a graph of the curve of best fit.

When finished tab down to **OK** and click on it.

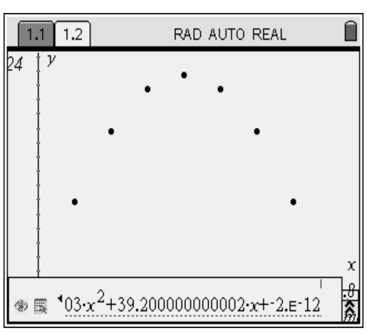


The quadratic regression information will be pasted in Columns C and D.

To resize column D select menu 1 (for Actions), then 2 (for resize). Adjust the size of the column using arrows on the nav pad.
Press enter to lock in the width you have chosen.
Press esc.

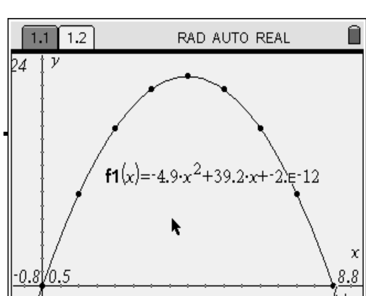


Press ctrl and **right arrow** to get back to your scatter plot
Select menu 3 1 to select **Function.**



Notice the function f2 is showing at the bottom of your screen

Use the **up arrow on the Nav pad** to move you to f**1**. You will see that your equation has been pasted there.

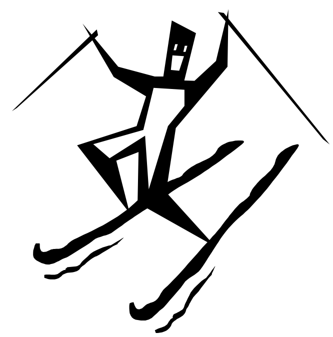


Press enter and your equation will be graphed.

Use [ctrl] [G] to get rid of the function entry line at the bottom of the screen.

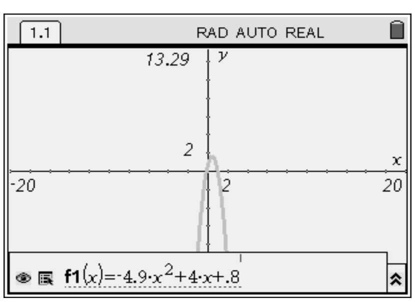
3) Tracing a Function

A water-skier slides up a ramp and flies off the end. His height above the water is given by the equation $y = -4.9x^2 + 4x + 0.8$, where x is the time, in seconds, after the skier leaves the ramp, and y is the height, in metres, of the skier above the water.

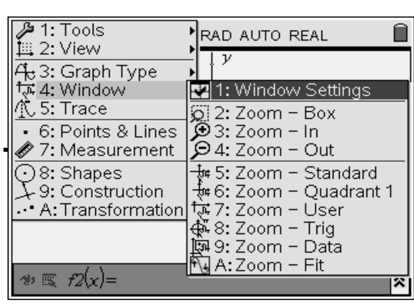


Press [home] [8] [1] and under **Display Digits** select **Float 3** by clicking on the pull down menu. Press [enter]. Use the [tab] key to tab down to **Apply to System** and press [enter]. Click on **OK** when asked "Do you wish to apply current settings to system settings?".

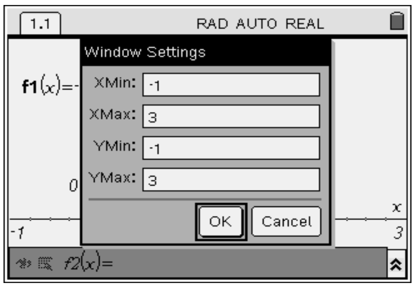
Press [home] [6] to open a new document and Select **2:Graphs and Geometry**. (If you are asked if you wish to save a previous document, just click on "No").



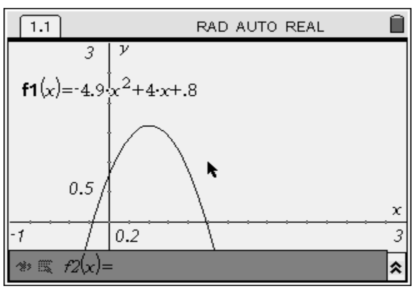
Type in the equation in the **f1** position at the bottom of your screen.



In order to zoom in on the important part of your graph, adjust the window settings by pressing menu 4 1.

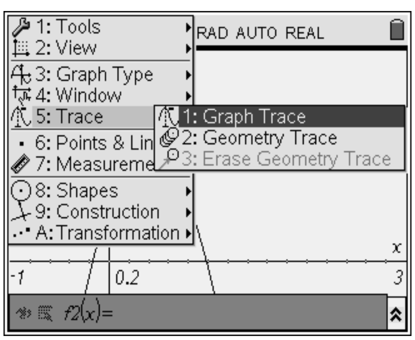


Type in the new values for your window. Use the tab key to move from one box to the other. Click on **OK** .

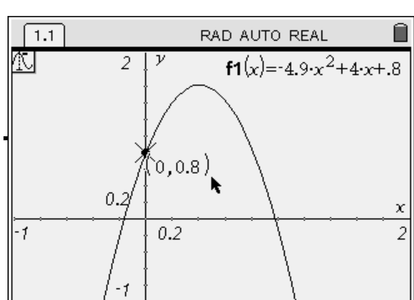


You now have a better view of your graph.

To get rid of the equation entry at the bottom of the screen press ctrl G.

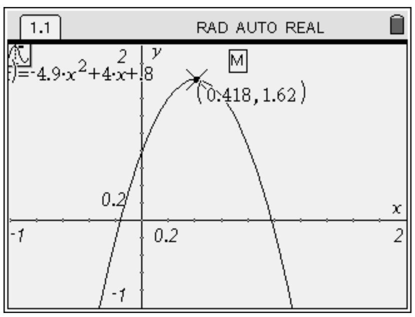


Press menu 5 1 in order to locate specific points on your graph.



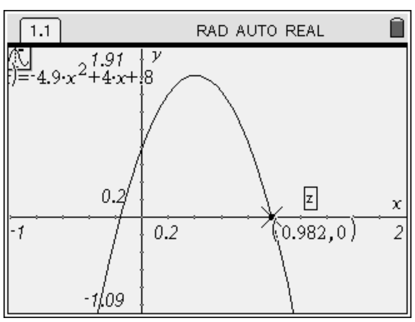
The first point you will see is **the y-intercept**.

What does this point mean relative to the water-skier?
(Remember every ordered pair stands for a (time,height) value.)



Use the right arrow key to move your point along the graph. You will know you have reached **the vertex** of the graph when you see an M appear. (M stands for maximum)

What does this point mean relative to the water-skier?



Continue tracing using the right arrow on the nav pad until you reach **the x-intercept**. You will know it is the intercept when a small z appears beside your point. (z stands for zero)

What does this point mean relative to the water-skier?

