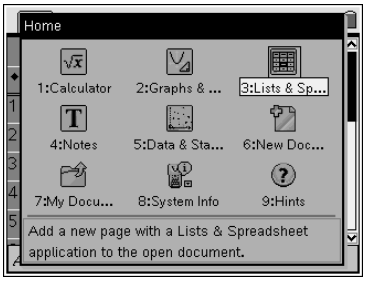
Is It or Isn't It Proportional

For each situation, create a table. Using your TI-Nspire handheld, enter data in a spreadsheet, determine a linear regression, then graph the data. Determine which situations may be described as a proportional linear relationship, and which situations are examples of a non-proportional relationship.

Step-by-step directions

For each situation, create a table using Lists and Spreadsheets. Create a graph from the data, then determine which situations may be described as a proportional linear relationship, and which situations are examples of non-proportional relationships. Instructions are listed below for the first situation, "Honey, I Shrunk the Kids."

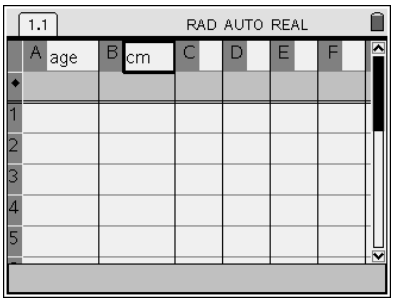
A. *After turning on the TI-Nspire handheld, Choose Home and select **3. Lists and Spreadsheets.** Press **Enter** or the **Click Button** ⬤*



B. *Highlight the white space just to the right of A in column A, type the title of the domain in the given situation.*

C. *While the space is still highlighted, press menu 1 to choose Menu, Action. Press the **RIGHT ARROW** on the navpad for **ACTION** choices.*

D. *From this menu, highlight **2.Resize**, and press ⬤.*



E. With the entire column highlighted, press the right arrow on the navpad to widen the column. Make sure the entire text is visible, then press ⚙ and press esc.

F. *Highlight the white space just to the right of B in column B, type the range title for the given situation and press enter*

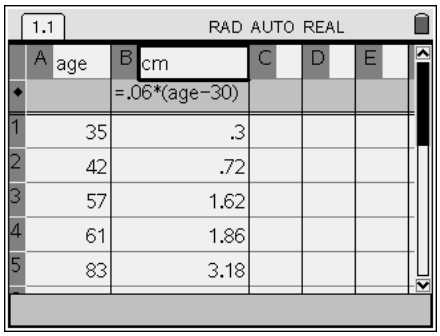
G. Use the same procedure to widen column B as you used to widen Column B.

H. You are now ready to enter data and functions in the cells of your Lists and Spreadsheets. Enter a function in Column B to calculate a resulting Y- (range) value for each X- (domain) value.

I. Beginning in Cell A1, manually enter the given x-values.

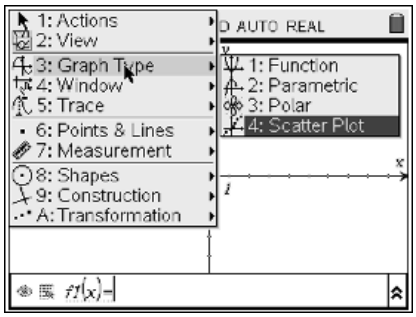
J. In column B, enter the indicated function that will calculate each Y- (Range) value. Functions are indicated by entering = followed by the function or operation. In the first described situation, relating age to the number of centimeters per year that humans decrease, the function would be entered as

K. "'=0.06(age-30)." Each scenario will have a different function, but it will be entered in the same way.

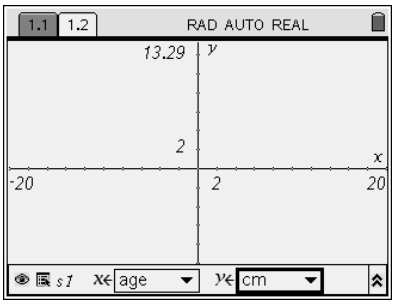


L. Analyzing Data – Graph of "Honey, I Shrunk the Kids" data as an example

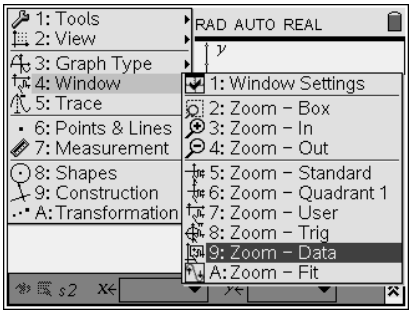
1. *Use the shortcut ctrl I to insert a new page in your document.*
2. *Choose 2:Add Graphs & Geometry*
3. *Press menu 3 4 to choose Menu, 3:Graph Type, 4:Scatter Plot*

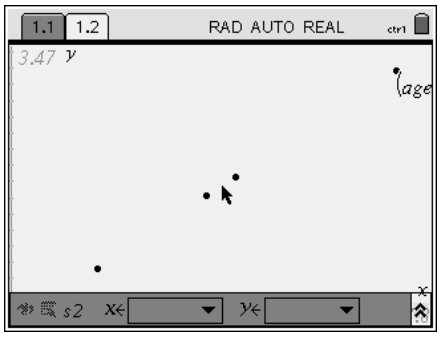


4. Press ⬤ to open the x-values, insure "age" is highlighted and press ⬤ clear
5. Move to the right to highlight the y-values list, and press ⬤
6. Select "cm," and press ⬤



7. Press menu 4 9 to choose Menu, 4:Window, 9:Zoom – Data.



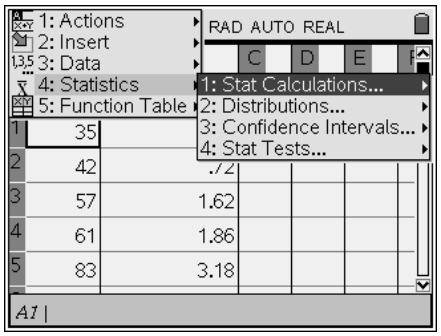


M. Analyzing Data – Linear Regression

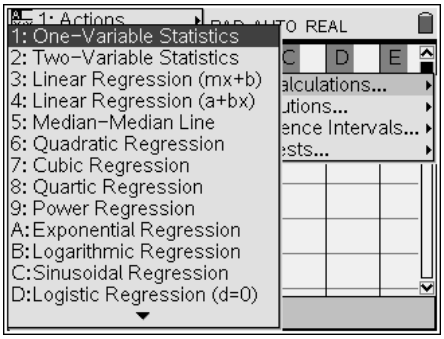
Next, determine the regression equation for the set of data.

1. Press ctrl ◀ (to the left of the NavPad) to return to the spreadsheet.

2. Press (menu) (4) (1) to choose Menu, 4:Statistics, 1:Stat Calculations.

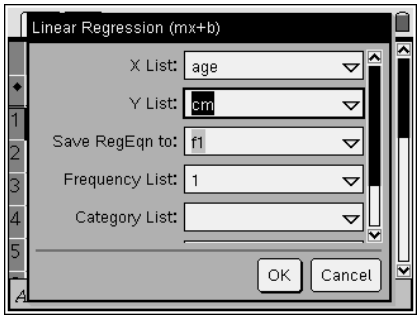


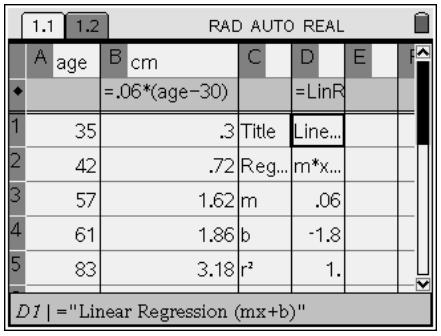
3. Press press (3) to choose 3:Linear Regression (mx + b)



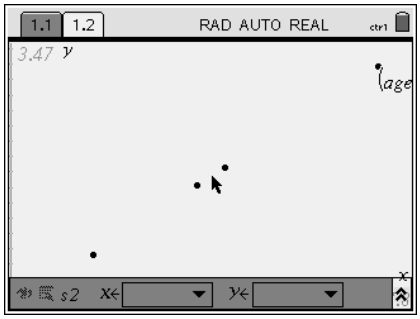
4. The Linear Regression set up box will appear on the screen.

a. Press the down arrow on the NavPad cursor control to choose ' age,' and press ·
b. Press the (tab) key to change to the Y-list. Press the down arrow key and choose 'cm.'
c. Press the (tab) until OK is highlight and press the · button.

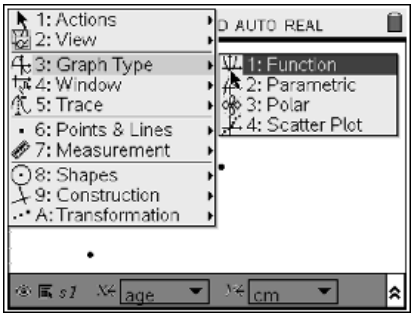




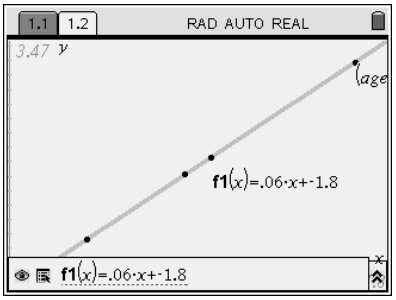
5. Press ctrl to return to the Graphs & Geometry page.



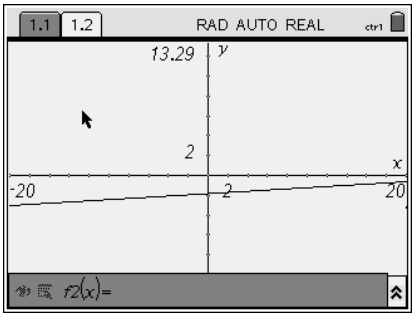
6. Press menu 3 1 to choose Menu, 3:Graph Type, 1:Function.



7. Press the ▲ key so that the f1(x) appears in the Entry Line, and then press the enter key to discover the Linear Regression that describes this data. Note the function on your Activity Sheet to compare with the functions which describe the other situations on the Activity Sheet.



8. Press menu 4 5 to choose Menu, 4:Window, 5:Standard. Sketch this graph on your Activity Sheet to compare with the graphs



TI-nspire™

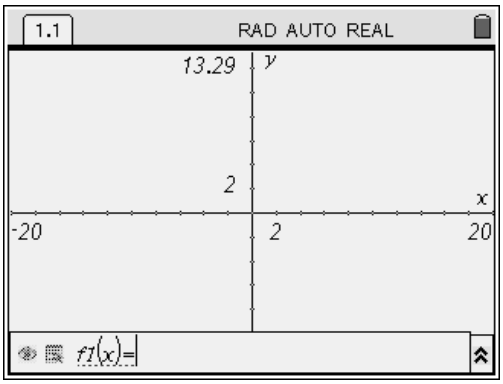
Grade level: 8-12
Subject: mathematics
Time required: 45 to 90 minutes

I. In the movie, "Honey, I Shrunk the Kids," Wayne Szalinski's invention shrunk his children and their friend to a size smaller than a blade of grass. Of course, the movie is fictional, but did you know that after a person turns 30 years of age, he or she shrinks about 0.06 centimeters per year? At that rate, how many centimeters shorter would a person be when he/she is 35, 42, 57, 61 and 83 years old? Create a function table of this data. (Astronauts spending long periods of time in space, "grow" while weightless.)

Shorter after 30

Domain (x)- Age	**Process**	**Range (y) – centimeters shorter**
n	0.06 (n-30)	f(n)

Sketch the graph of this relationship.



I. Is this linear relationship proportional or non-proportional?_____

Justify your answer, referring to both the function and the graph.

TI-nspire™

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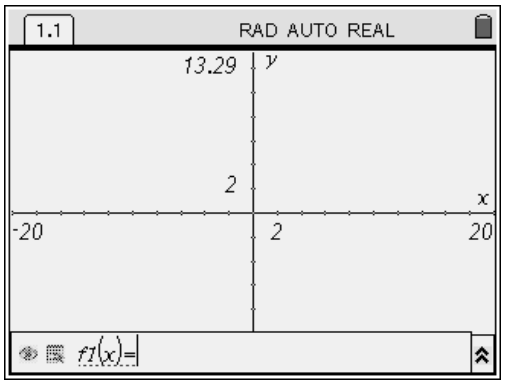
II. Have you ever noticed that you see lightning before you hear the thunder? That time difference can be used to estimate the distance in feet between you and a lightning strike. Create a function table with this data.

Lightning and Thunder

Domain (x) – Time in seconds	Process	Range (y) – Distance in feet
n	1,110n	f(n)
2		
5		
11		
16		
19		

II. When the lightning strike is one mile away from you, how many seconds will pass between the moment you see the lightning and the moment you hear the thunder?_____

Sketch the graph of this relationship.



Is this linear relationship proportional or non-proportional?_____
Justify your answer.

TI-nspire™

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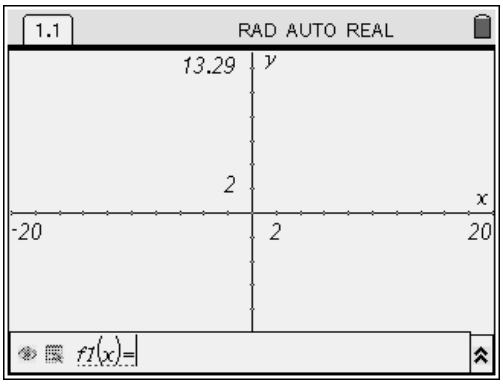
III. Most 16-year-olds have an accident during the first three months of having a driver's license. "Tailgating" is one common cause of these accidents. Determine the stopping distance in feet for a car traveling at various spends. Create a table of this data.

Velocity versus Stopping Distance

Domain (x) – Velocity in MPH	**Process**	**Range (y) – Stopping distance in feet.**
n	3.48n - 20	f(n)

Sketch the graph of this relationship.



III. Is this linear relationship proportional or non-proportional?_____

Justify your answer.

TI-nspire™

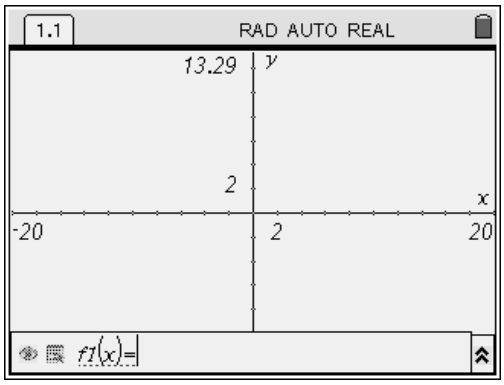
Grade level: 8-12
Subject: mathematics
Time required: 45 to 90 minutes

IV. A person's recommended weight is a function of his/her height. Complete the following function table showing the relationship of this data.

Height vs. Recommended Weight

Domain (x) – Height in inches	Process	Range (y) – Recommended weight in pounds (lbs.)
n	$\frac{11(h-40)}{2}$	f(n)
60 inches (5 feet)		
64 inches		
69 inches		
72 inches		
75 inches		

Sketch the graph of this relationship.



IV. Is this linear relationship proportional or non-proportional?_____
Justify your answer.

Assessment and evaluation

- *Examine the graph and the function notation that describes the relationship in each situation.*
  - *How are they similar?*
  - *How are they different?*
- *If a function describes a proportional relationship, what unique characteristic is evident?*
- *If a proportional relationship is graphed, what unique characteristic is evident on the graph?*
- *Create a valid proportion. Change the form of the relationship to function notation. Show your work.*