Is It or Isn't It Proportional

by – Beth Loughry

Activity overview

Students are expected to use multiple approaches (algebraic, graphical, and geometric methods) to solve real-life problems from a variety of disciplines. In this activity, students will examine data from various disciplines and determine whether the relationship is proportional or non-proportional. Students will then compare and contrast functions and graphs to determine characteristics of proportional relationships and characteristics of non-proportional relationships.

Concepts

- *Linear functions*
- *Proportional relationships*
- *Non-proportional relationships*
- *Constant rate of change*
- *Domain*
- *Range*

Teacher preparation

Students should have experience with the TI-Nspire handheld prior to the activity. Since this is a discovery activity, only basic understanding of a proportion and of a linear function is necessary. Obtain a copy of or a short clip from "Honey, I Shrunk the Kids" to engage the students in the activity.

Classroom management tips

A TI-Nspire handheld for each student keeps students on task. Playing a short clip from "Honey, I Shrunk the Kids" will engage the students.
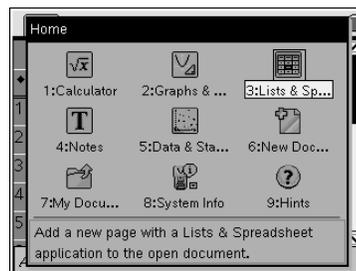
TI-Nspire Applications
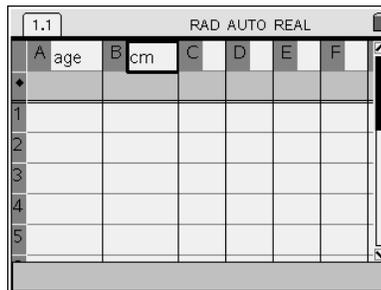
Lists & Spreadsheets
Graphs & Geometry

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.

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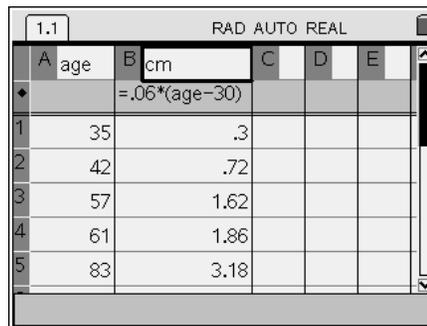
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TEXAS
INSTRUMENTS

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 A.*

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.*

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*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*
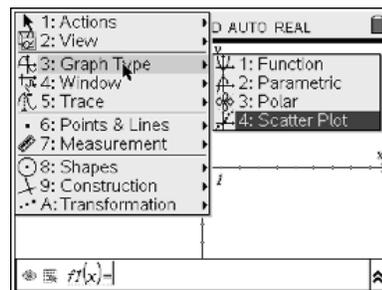
4. *Press* ⊚ *to open the x-values, insure "age" is highlighted and press* ⊚ (clear)
5. *Move to the right to highlight the y-values list, and press* ⊚
6. *Select "cm," and press* ⊚
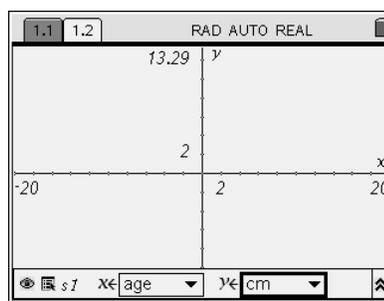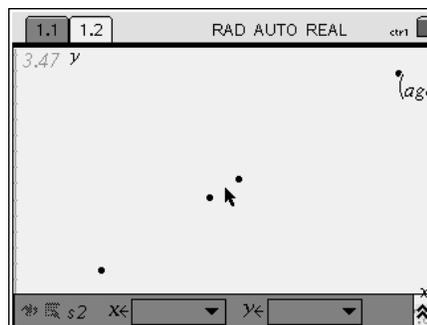
7. *Press* (menu)(4)(9) *to choose Menu, 4:Window, 9:Zoom –Data.*
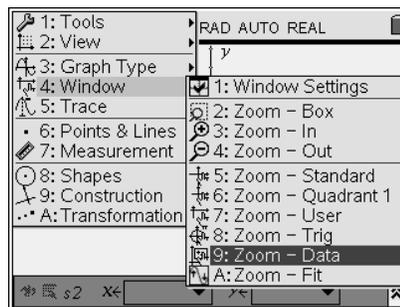
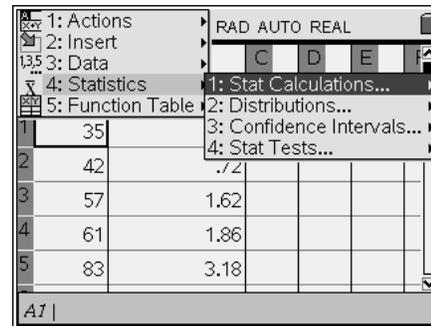*M. Analyzing Data – Linear Regression*

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

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

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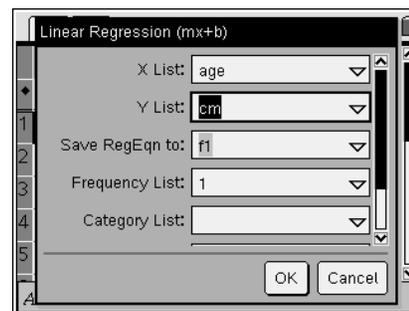*2. Press menu (4)(1) to choose Menu, 4:Statistics, 1:Stat Calculations.*

3. Press press (3) to choose 3:Linear Regression (mx + b)
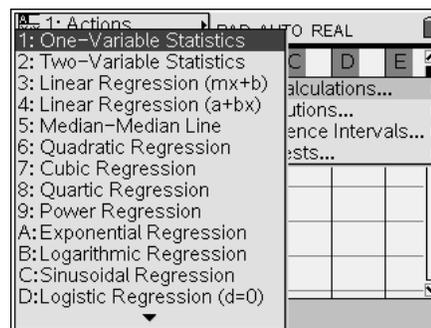
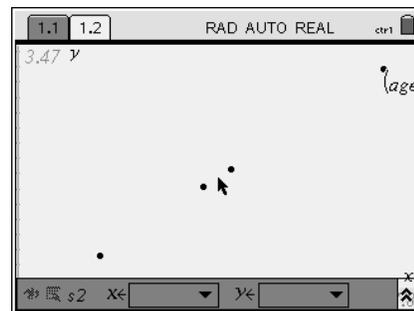*4. The Linear Regression set up box will appear on the screen.*

    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.'
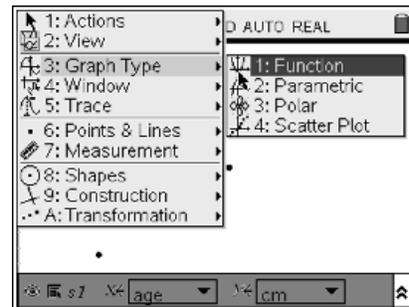   *c. Press the (tab) until OK is highlight and press the* ⊙ *button.*

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5. Press ⌃ 🔲 *to return to the Graphs & Geometry page.*

6. Press (menu) ⟨3⟩ ⟨1⟩ *to choose Menu, 3:Graph Type, 1:Function.*

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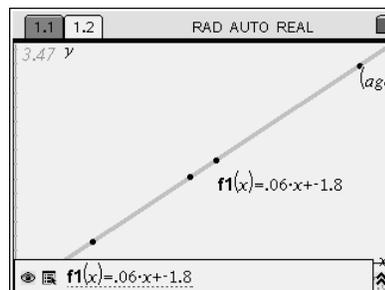
8. Press (menu) (4)(5) to choose Menu, 4:Window, 5:Standard. Sketch this graph on your Activity Sheet to compare with the graphs
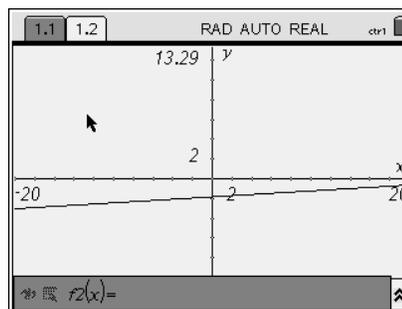
Assessment and evaluation

- *Examine the graph and the function notation that describes the relationship in each situation.*
  - o *How are they similar?*
  - o *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.*

Activity extensions

- *Create additional scenarios that are described by a proportional relationship.*
- *Create scenarios that are described by a non-proportional relationship.*

Student TI-Nspire Document
honey.tns

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