Group members: _____
_____
_____

How Much Does Bubble Gum Stretch a Rubber Band?

As you complete the TI-Nspire ™ handheld file, "Bubble Gum.tns" (figure 1) complete the following questions:

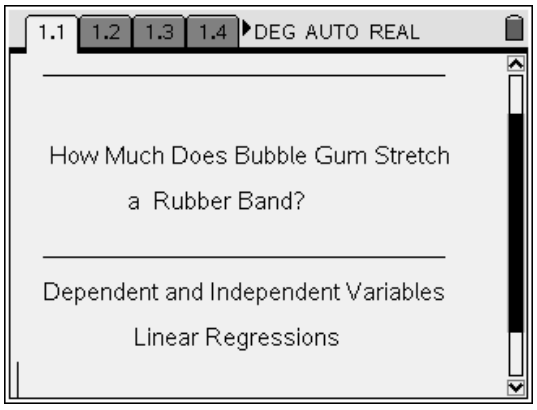

Figure 1

Introduction: (page 1.2)

What is the difference between dependent and independent variables? For instance:

A. If you must put gasoline into your car and you only have a certain amount of money, is the amount of gasoline that you can purchase dependent on the amount of money that you have, or is the amount of money that you have dependent on the amount of gasoline that you can purchase? _____
   Dependent term: _____
   Independent term: _____

B. If rain falls into a bucket, is the length of time that it is raining dependent on the amount of rain in the bucket, or is the amount of rain in the bucket dependent on the length of time that it is raining? _____
   Dependent term: _____
   Independent term: _____

C. If you have pieces of bubble gum and want to see how much the gum will change the length of a rubber band, which is the dependent and which is the independent term?
   Dependent term: _____
   Independent term: _____

Experiment: How Much Does Bubble Gum Stretch a Rubber Band?
(page 1.3)

Materials: Individually wrapped bubble gum, paper cup, paper clip, metric ruler, TI-Nspire™ handheld

Your Mission:

- Answer the question at the top of this page.
- Based on your answer to question "C" on the previous page, complete the table on page 1.4 of the "Bubble Gum.tns" file. Columns "A" and "B" are labeled "pieces" and "cm" respectively. (Figure 2)

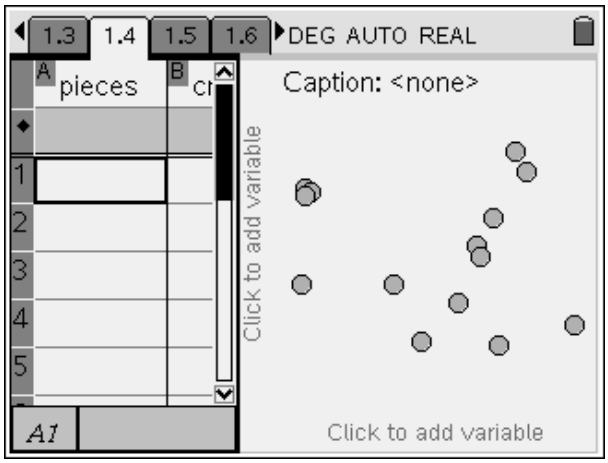

Figure 2

There is no wrong way to set up this experiment. Good Luck!

Analyzing the Bubble Gum Lab Data:

On the right hand side of page 1.4, find the equation of the line which passes through the data points.

Step 1: To get to the right side of page 1.4, press ctrl tab.

Step 2: Navigate the Nav Pad to the bottom of the screen where the message "Click to add variable" is located. Press ⭕ and select either "Pieces" or "cm" for the independent variable. Next, navigate the Nav Pad to the left side of the screen where the message "Click to add variable" is located. Press ⭕ and select either "Pieces" or "cm" for the dependent variable. If you would like to change your viewing window for the graph, press menu "Window/Zoom" then "Window Settings". Enter the information for an appropriate viewing window for your data. To go from one line to next, press tab.

You have just created a quick graph of your data! Next, find a line of best fit for your data.

Step 1: Press (menu), "Actions" then "Add Movable Line".

Step 2: Navigate the Nav Pad to the line and press (ctrl) (·) in order to grab and move the line to a location that best fits your data. Press (·) again to release the hand for the drag and move option.

Step 3: Find the regression equation: Press (menu), "Actions" then "Regression".

On page 1.5: Compare your line of best fit with the graphing handheld's linear regression: What is the slope and y intercept for the equation for each line? What does the slope represent? What does the y-intercept represent? How did your line of best fit compare with the graphing handheld's linear regression?

On Calculator page 1.6, find details regarding the regression equation: (Example shown in Figure 3.)

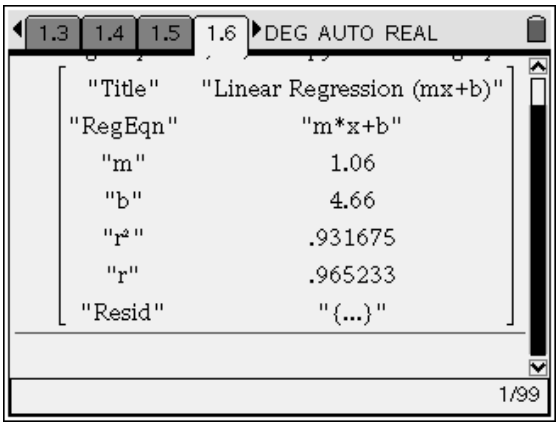

Figure 3

Step 1: Press (menu), "Statistics," "Stat Calculations" then "Linear Regression (mx+b).

Step 2: Press (·) and select the dependent variable from your experiment. (Either "pieces" or "cm.") To go from one line to next, press (tab).

Step 3: Press (·) and select the independent variable from your experiment. (Either "pieces" or "cm.") To go from one line to next, press (tab).

Step 4: Select "f1" on the "Save RegEqn to" line.

Step 5: The frequency list should be "1".

Step 6: The category lists should be empty.

Press (·) on "OK"

On page 1.7:

Step 1: Press enter in order to graph the regression equation again.

Step 2: Press menu "View" then, "Add Function Table"

Step 3: Press menu "Function Table" then, "Edit Function Table Settings".

Step 4: tab down to "Independent" then select "Ask" with the ctrl key.

Step 5: tab down to "OK"

Prediction: On page 1.8 answer the following:

Using the graph, the table, or your equations, estimate how much a rubber band would stretch with 50 pieces of gum. Next, estimate for 100 pieces of gum.

Your Answer: 50 pieces: _____

100 pieces: _____

Problem #2: Application: Following the same procedure as in the previous problem, find the equation of the line of best fit for the data listed below, which is based on data from the United States Geological Survey (USGS) timeline, "Events Affecting the U.S. nonfuel minerals industry, 1900-2000" from:
http://minerals.usgs.gov/minerals/pubs/commodity/timeline/timeline.pdf

(Year, U.S. Non-fuel minerals consumption (million metric tons)):
(1984, 1500); (1986, 2000); (1993, 2250); (1995, 2600); (1998, 3000)

Next, find the amount of U.S. minerals consumption in millions of metric tons for the year 2010.