Introduction to Function Notation

Teacher Notes for Student Activity (TI-84)

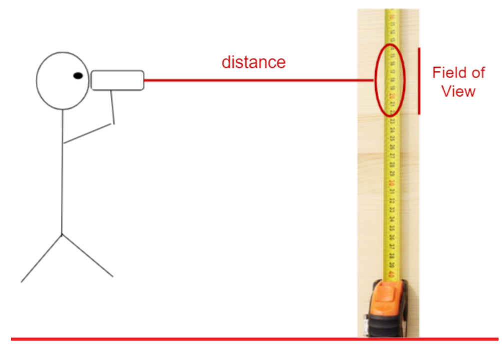
Name ______________________

Class ______________________

In this activity students will collect data on the **field of view** that they can see through a "telescope" at **varying distances**. They will then use their data to make predictions on the field of view at other distances.

Put students in groups of 3 or 4. Have the groups assign one person to look through the telescope, one person to measure the distance from the telescope to the yard stick, one person to call out the field of view diameter, and one person to record the data on the data table below.

Here is a diagram of the set up.



An extension is to have different lengths of telescopes. A couple groups could have a full paper towel tube, a couple could have a tube ⅓ the full length and other groups could have a tube ⅔ of the length. The different lengths will produce different rates of change of the field of view.

Collect Distance vs FOV Data for FIVE different distances (there will be two blank rows)

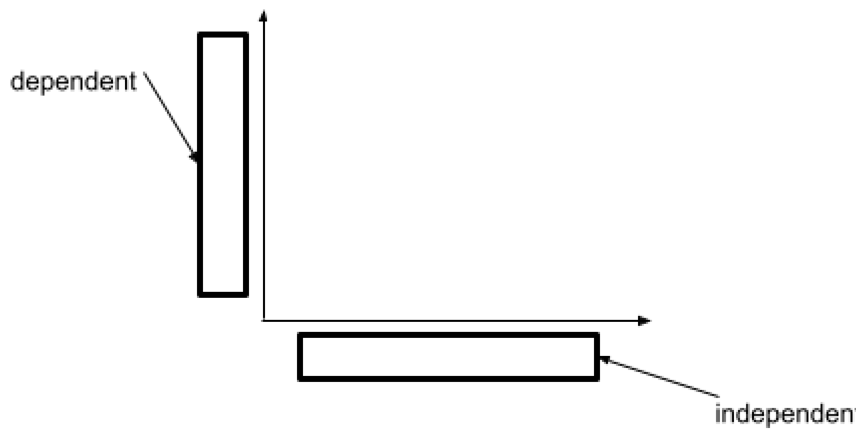
Distance (inches)	Field of View (inches)	FOV Estimate from axis using fitted line	Prediction from function ***m1(x)***

1. Press Stat and Edit and enter your five Distance and Field of View data values.

2. Press 2nd Y= to set up your StatPlot. Determine which variable is the independent variable and which is the dependent variable and make sure you have the correct list assigned to X and Y. Set your Window values and then Graph.

independent variable __Distance__ dependent variable ___Field of View____
(variable that does NOT depend on the other) (variable that depends on the other)

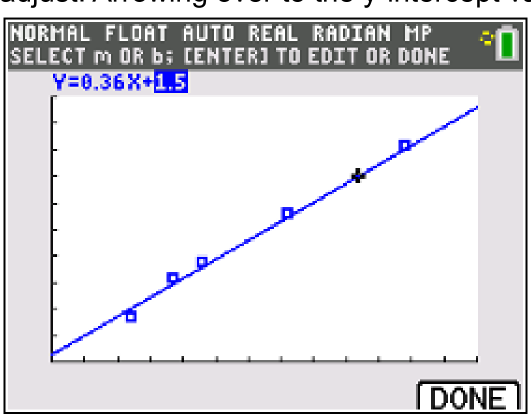
Add the variable names to the axes.



3. Insert a Manual-Fit Line by pressing Stat - Calc and then arrow down to Manual-Fit. The screen will ask you to Store EQ. Click on Vars, then arrow over to Y-vars, Function, and select Y1. Then click Enter on Calculate.

   The TI-84 will take you to the scatter plot and tell you to Drop Points. Use the arrow keys and Enter to drop two points that are as close to the best fit line as possible. (Clicking the Graph button, the soft-key for STYLE in the bottom right, will let you change the color and thickness of the line.)

   When the line is placed you will have a chance to manually enter a value for slope and see the line adjust. Arrowing over to the y-intercept value will allow the manipulation of that value as well.



   Let's think about the slope and y-intercept.

If you had a distance of zero, what should your field of view be?__the diameter of the tube, or approximately 1.75 inches_

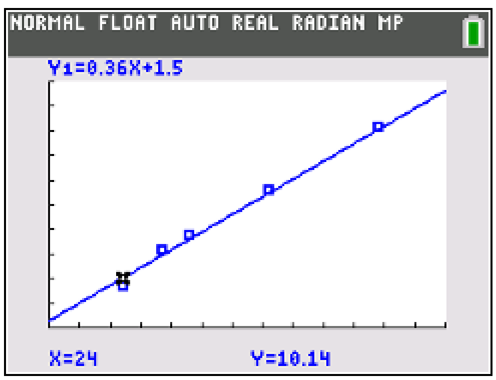
Adjust your line so that if you put a zero in for the x-variable (the distance) you would get that value as your field of view.

Can you explain what the slope value means with respect to the distance and field of view? For example, as your distance increases 10 inches, your field of view will increase ______ inches.
If the slope were .4 or 4/10 then as the distance increases 10 inches, my FOV will increase 4 inches. (If you have used differing lengths of telescopes you can compare the slopes to see that the shortest telescopes have the largest slopes.)

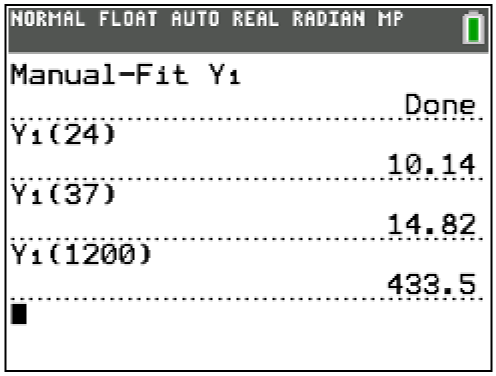
Once you position the line to best model the data, record your equation below. (round to the nearest tenth). When you click the Graph button, that is the soft-key for Done, that will set the line and store it in Y1.

$\mathbf{Y_1(\mathit{x})}$ = ___________________________

4. Press Trace and arrow down to place the cursor on the line not the data point. Type the number you have for your 1st distance value. The Trace command should give you the y-value from the manual-fit line. For each of your distance values, estimate the field of view using your fitted line and the axes on your graph. Put these estimations in column 3 in your table.



5. Press 2nd Mode to quit the graph page and return to a calculator page. Use Y_1 function notation to calculate the field of view for the distances in your data. On the calculator page use the VARS button to select $\mathbf{Y_1}$. Type parentheses and enter the distance, like $\mathbf{Y_1}$(__). Put this value in the last column as the Predicted value from the function for each distance (round the decimal to the nearest tenth).



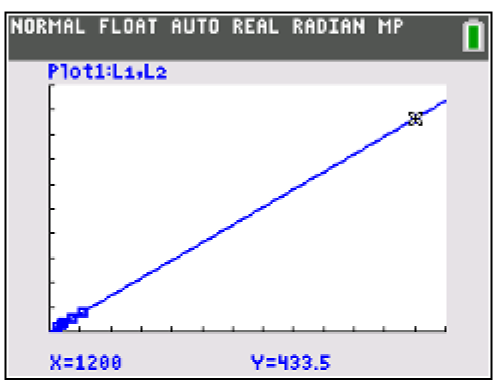
6. Choose a different distance from your horizontal axis and use the linear model to estimate what the field of view would be for that distance. **Add this distance and field of view value to your table above** in the 6th row by filling in "distance" and "FOV Estimate from axis using fitted line" columns. Use the function notation, **Y**$_1$(*dist*) on the calculator page as well to get the predicted FOV value.

   If we stood _____inches from the wall, our field of view would have been _____ inches.

7. Select a distance of 100 feet (1200 inches) and use the function notation **Y**$_1$(1200) to calculate your field of view at a 100 foot distance. Put this data in your table on row 7 in the correct columns.

   If we stood _1200_inches from the wall, our field of view would have been _____ inches.

You can put this data point in your Stat Editor and adjust your Window to see this new data point to verify that it is on the Manual-Fit Line.



Name ____________________
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FUNCTION NOTATION	*m1*(**dist**) = **fov** m1(**input**) = **output** *m1*(**independent var**) = **dependent var** *m1*(**x**) = **y** Our function was called *m1*. Many times we name functions with the letter *f*. So a typical function notation is: *f*(**x**) = **y**. **x** is the input, **y** is the output OR **x** is the independent variable, **y** is the dependent variable