ALGEBRA I ACTIVITY 2:
EXPLORING LINEAR EQUATIONS

ACTIVITY OVERVIEW:
In this activity we will

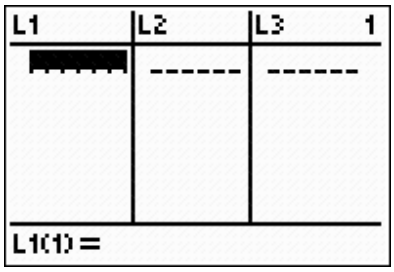
- Enter "life expectancy" data into lists and set up scatter plots.
- Trace the scatter plot to select two points. Use the points to calculate slope and write a linear equation.
- Use the Transformation Graphing APP to fit the data using a linear equation in slope-intercept form and analyze the meaning of the slope and the intercept in relationship to birth year and life expectancy.

U. S. Life Expectancy at Birth

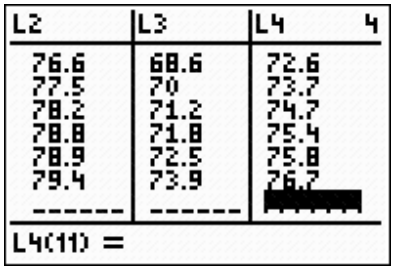
Birth Year	Female	Male	Combined
1940	**65.2**	**60.8**	**62.9**
1950	**71.1**	**65.6**	**68.2**
1960	**73.1**	**66.6**	**69.7**
1970	**74.7**	**67.1**	**70.8**
1975	**76.6**	**68.6**	**72.6**
1980	**77.5**	**70.0**	**73.7**
1985	**78.2**	**71.2**	**74.7**
1990	**78.8**	**71.8**	**75.4**
1995	**78.9**	**72.5**	**75.8**
1998	**79.4**	**73.9**	**76.7**

(2000 World Almanac, p. 891)

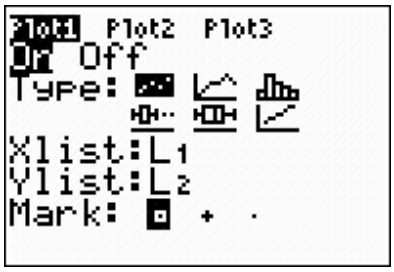
Press [STAT] [1].



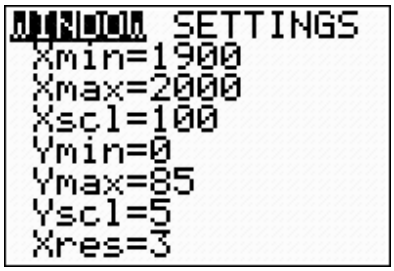
Enter Birth Year into L1, Female Life Expectancy into L2, Male Life Expectancy into L3, and Combined Life Expectancy into L4.



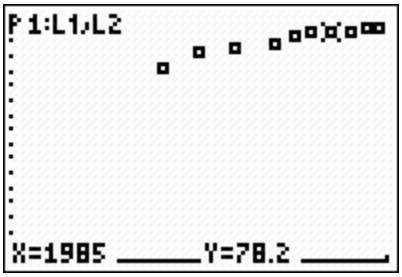
Set up a scatter plot of Birth Year versus Female Life Expectancy. Press [2nd][Y=] for the STAT PLOT menu. Press [ENTER] [ENTER]. This will select Plot 1 and turn it on. Because the defaults are "scatter plot, L1 and L2" no other settings need to be changed.



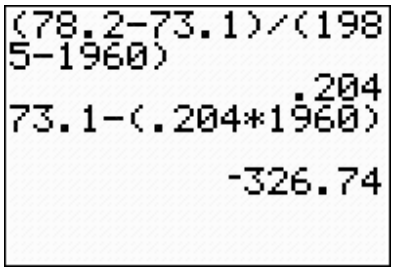
Press [WINDOW] to set the window with the settings shown.



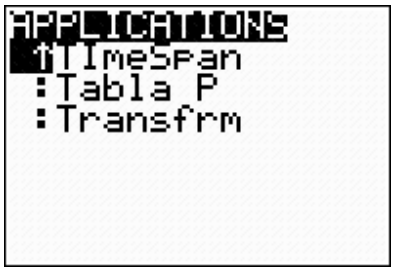
Press [TRACE]. Select two points that seem to fall on the line that would best fit the data.



Using the x and y values from the two points, calculate the slope. Then use the point slope form to calculate the y-intercept. Discuss the meanings of both numbers (for each year after 1940 you were born, you should live about 2 tenths of a year longer…if the trend continued into the past, then in the year 0 people would have lived -327 years).

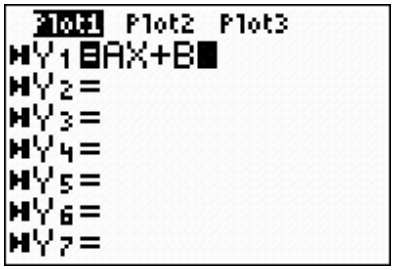


Press [APPS][ALPHA][4] and locate the Transformation Graphing APP (Transfrm). Select the APP.

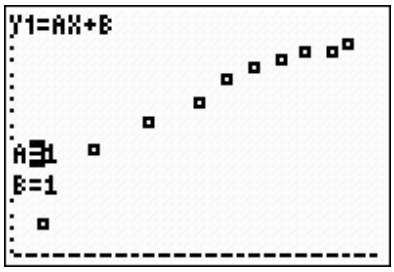


Press any key as directed. You will be sent to the home screen and it will appear as though nothing has happened.

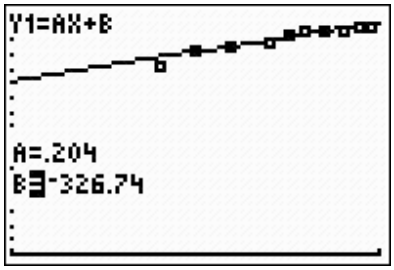
Press [Y=] to see the effect of engaging the APP. Enter the general form of a linear equation by pressing [ALPHA][MATH][X,T,Θ,n] [+][ALPHA][APPS].



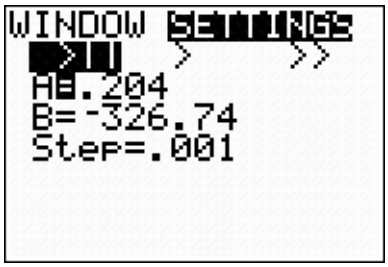
Press [GRAPH]. By default A will be set at 1 and B will be set at 1 unless the APP has been used since the calculator was reset.



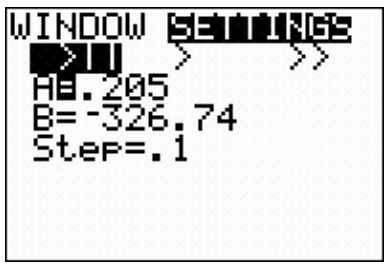
Type in the value of A found when calculating slope in an earlier step (.204 in the example). Press [ENTER], then press [▼] to type in the value of B (-326.74 in the example). Press [ENTER].



To adjust the slope of the line for fine-tuning, press [WINDOW][▲] to view the settings. Reset the step to .001. Return to the graph. Use the right and left arrows to adjust A to try to slightly to improve the fit.



To further adjust the line for fine-tuning, press [WINDOW][▲] to view the settings. Reset the step to .1.



Return to the graph. Use the right and left arrows to adjust B to further improve the fit.

Repeat for the life expectancy of males or for males and females combined. This allows students to practice using two points to calculate slope and write a linear equation and get immediate feedback on their accuracy.