

TI Technology Guide for How the new Olympic swimsuit gives athletes an edge

TI-83 Plus and TI-84 Plus Families

Creating Lists of Data and Displaying the Graphs

- In L1 of the graphing calculator, enter the years for the women's world records.
Enter the corresponding record times in L2.

1. To enter the data from the Snapshot in the activity, press **CLEAR** and select **1:Edit** to access the **List Editor** window. Be sure to clear any existing data in the lists by highlighting the list name and pressing **CLEAR****ENTER**. If you see a list other than L1 through L6, press and select **STAT****5:SetUpEditor****ENTER** and then follow the above instructions.

L1	L2	L3	1
-----	-----	-----	
L1(1) =			

2. Move the cursor to the first data position in L1. Enter data from the Snapshot that represent the year for the women's world records.

L1	L2	L3	1
1958	61.2	-----	
1960	60.2		
1962	59.5		
1964	58.9		
1972	58.5		
1973	57.54		
1975	56.22		
L1 = (1958, 1960, 1...			

3. Move the cursor to the first data position in L2 and enter the corresponding record time for that year.

- In L3, enter the years for the men's world records, and enter the corresponding times in L4.

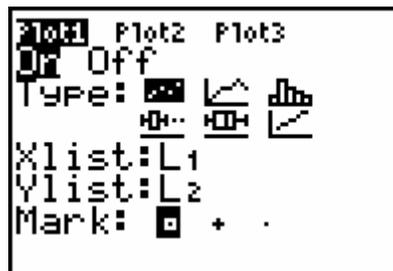
L2	L3	L4	4
61.2	1956	55.4	
60.2	1957	54.6	
59.5	1961	53.6	
58.9	1964	52.9	
58.5	1967	52.6	
57.54	1970	51.94	
56.22	1972	51.22	
L4 = (55.4, 54.6, 5...			

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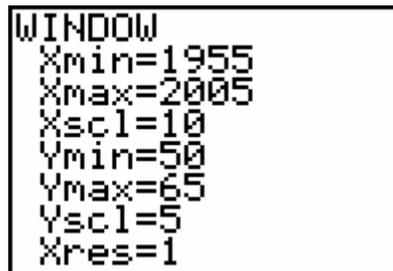
TI-83 Plus and TI-84 Plus Families

- Turn on STAT PLOT 1 and graph the progression of the women's world record from 1958 to 2004. Make sure the other two STAT PLOTS are turned OFF.

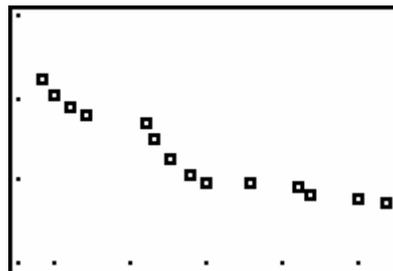
4. Access the STAT PLOTS menu screen by pressing $\boxed{2\text{nd}}\boxed{Y=}$. Select (press $\boxed{\text{ENTER}}$ or $\boxed{1}$) 1:Plot1 to get the screen shown. Notice that Plot1 and On are highlighted. To turn on or off any plot, place the cursor over the name, press $\boxed{\text{ENTER}}$, then select either On or Off, and press $\boxed{\text{ENTER}}$ again. This process acts like a toggle switch to turn the plots on and off the graphing display. Plot1 should have the same settings as shown at the right.



5. To insure that all the data points are visible, press $\boxed{\text{WINDOW}}$ and enter values for the x-axis and y-axis that contain the range of values for the data shown in the graphic (see suggested values at the right).



6. Press $\boxed{Y=}$ and clear any equations listed. Press $\boxed{\text{GRAPH}}$ to view the scatter plot. Years (L1) are on the horizontal axis, and women's record times (L2) are on the vertical axis.



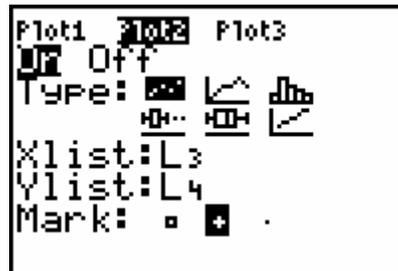
7. Press $\boxed{\text{TRACE}}$ and use the $\boxed{\text{right}}$ or $\boxed{\text{left}}$ keys to read the values of the data points.

TI Technology Guide for How the new Olympic swimsuit gives athletes an edge

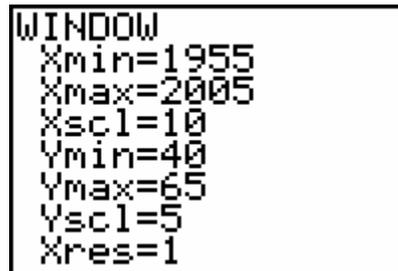
TI-83 Plus and TI-84 Plus Families

- Now go back to the STAT PLOTS and turn on PLOT 2 and graph the progression of the men's world record from 1956 to 2000.

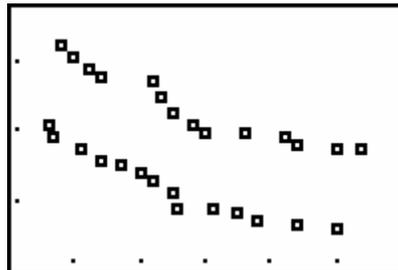
8. Press $\boxed{2\text{nd}}\boxed{Y=}$ and move the cursor to Plot2 at the top of the screen and press $\boxed{\text{ENTER}}$ to highlight Plot2. Repeat the previous procedure for a scatter plot for Plot2 with the settings shown at the right.



9. Press Window and make changes to reflect the range of values for both data sets plotted in Plot1 and Plot2.



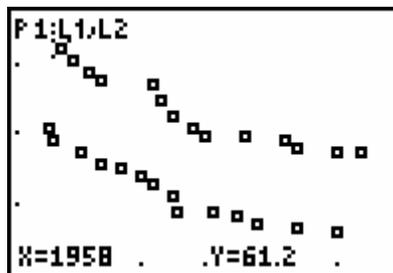
10. Another way to set the window for a scatter plot is to press $\boxed{\text{ZOOM}}\boxed{9}$. This will select 9:ZoomStat which will automatically set the viewing window and display all the data points from both scatter plots.



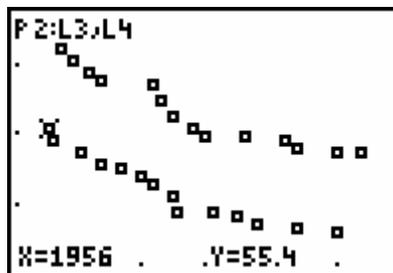
TI Technology Guide for How the new Olympic swimsuit gives athletes an edge

TI-83 Plus and TI-84 Plus Families

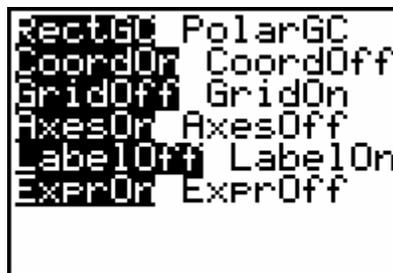
11. Press **TRACE** and use the **▶** or **◀** keys to move along a scatter plot. Press the **▲** or **▼** to move the cursor to the other scatter plot. The **▲** or **▼** keys will work as a toggle to move between the scatter plots.



12. Notice the values at the bottom of each screen. These are values from the original data sets. In the upper left corner of each screen you can identify which plot and what lists are graphed.



13 To make sure you will have these values press **2nd****[FORMAT]** and set the calculator screen to match the screen at the right.



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TI-83 Plus and TI-84 Plus Families

Projecting new world records

- Based on the data, what do you predict will be the next women's world record?
- Looking at the data and graph of the women's world records, predict the year and time for the next women's world record. You should test your prediction by adding the predicted year to L1 and the predicted record to L2. Replot this scatterplot to check if your prediction is reasonable.

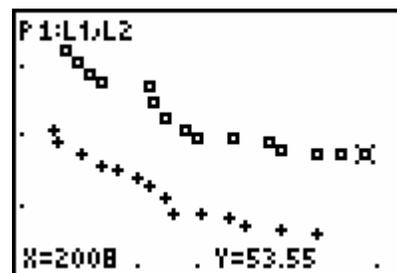
The following values are suggested answers and may vary.

14. Press **[STAT]** and select **1:Edit** to access the **List Editor** window. Move the cursor to the end of list L1 and enter the predicted year that you expect the new women's record to be broken. Base your answer on the time period for each new record during the last 20 years.

L1	L2	L3	Z
1986	54.73	1981	
1992	54.48	1985	
1994	54.01	1988	
2000	53.77	1994	
2004	53.66	2000	
2008	53.55	-----	
-----	-----		
L2(15) = 53.55			

15. Arrow to list L2 and enter the predicted time for the new world's record. Base your answer on the rate of decrease in the record over the last 20 years.

16. Press **[ZOOM]****[9]** to view the graph with the new data points. The graph should indicate whether or not your prediction is reasonable by following the behavior or trend of the data given.



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TI-83 Plus and TI-84 Plus Families

- Make a prediction of the year and time for the next men's world record based on the data and graph of the men's world records, Test your prediction by entering the predicted values in L3 and L4 and graphing the scatterplot of L3 and L4.

17. Press **[STAT]** and select **1:Edit** to access the **List Editor** window. Enter the predicted year in L3 and predicted time in L4.

18. Press **[V=]** and move the cursor to Plot1 at the top of the screen and if Plot1 is highlighted press **[ENTER]** to deselect so that it will not graph.

19. If Plot2 is highlighted, press **[ZOOM][9]** to see the graph of L3 and L4. If Plot2 is not highlighted move the cursor to Plot2 and press **[ENTER][ZOOM][9]** to graph L3 and L4.

20. Use your graph to test your estimated values as in step 15.

Extension

1. Enter the last six data points for the women's world record in L5 and L6 and create a scatter plot for this data.

L4	L5	L6	5
55.4	1980	54.73	
54.6	1986	54.48	
53.6	1992	54.01	
52.9	1994	53.77	
52.6	2000	53.66	
51.94	2004	53.55	
51.22	-----	-----	

L5(1)=1980

2. Press **[2nd][STAT PLOT]** and make the changes shown at the right.

STAT PLOTS			
1:	Plot1...On		
	↙ L5	L6	□
2:	Plot2...Off		
	↙ L5	1	+
3:	Plot3...Off		
	↙ L1	L2	□
4:	PlotsOff		

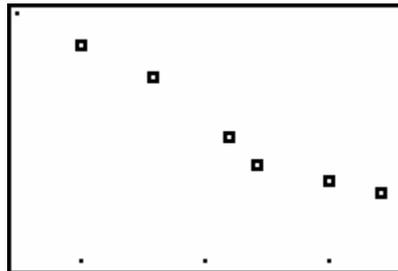
TI Technology Guide for How the new Olympic swimsuit gives athletes an edge

TI-83 Plus and TI-84 Plus Families

3. Press **WINDOW** and set the appropriate values for the years and record times.

```
WINDOW
Xmin=1975
Xmax=2005
Xscl=10
Ymin=53
Ymax=55
Yscl=5
Xres=1
```

4. Press **GRAPH**



5. To create the best fit model for the data press **STAT** **►** **5** **[L5]** **,** **[L6]** **,** **VAR** **►** **ENTER** **ENTER** **ENTER**. This will create a model to fit the data and store the model in the Y=Editor.

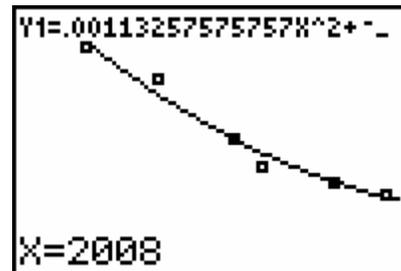
```
QuadReg L5,L6,Y1
█
```

```
QuadReg
y=ax2+bx+c
a=.0011325758
b=-4.564583333
c=4652.511182
R2=.9676898149
█
```

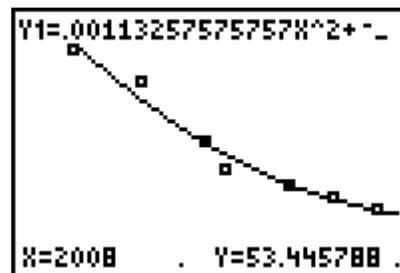
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TI-83 Plus and TI-84 Plus Families

6. Press **WINDOW** and change the Xmax to 2010. Press **GRAPH** **TRACE** **▲** 2008 **ENTER**.



7. The predicted world record for women in 2008 is at bottom of the screen.



8. Repeat the above method with the men's world records.