Going For The Gold!
ID: 12599

Activity Overview

In this activity, students use the Manual-Fit and Linear Regression commands to find lines of best fit to model Olympic data.

Topic: Data Analysis

- *Develop and evaluate inferences and predictions that are based on data*

- *Make conjectures about possible relationships between two characteristics of a sample on the basis of scatterplots of the data and approximate lines of fit*

Teacher Preparation and Notes

- *The lists provided with this activity need to be loaded on all calculators.*

- *TI-Navigator is not required for this activity, but an extension is given for those teachers that would like to use it. TI-Navigator can also be used to transfer the lists and then this activity can be used as-is.*

- ***To download the student worksheet and calculator files, go to education.ti.com/exchange and enter "12599" in the quick search box.***

Associated Materials

- *MGAct28_GoingGold_worksheet_TI73.doc*

- *ML1.73l, ML2.73l, WL3.73l, WL4.73l (lists)*

- *MGAct28_Nav_01_TI73.act*

- *MGAct28_Nav_02_TI73.act*

Suggested Related Activities

To download the activity listed, go to education.ti.com/exchange and enter the number in the quick search box.

- *An Olympic Plot (TI-73 Explorer and TI-Navigator) — 6696*

- *Line of Best Fit (TI-73 Explorer) — 5235*

- *That's a Stretch (TI-73 Explorer) — 4255*

**Problem 1 – Men's 100 Meter Dash**

To begin this activity, send L1, L2, L3, and L4 to the students' calculators. These are listed as ML1, ML2, WL3, and WL4 with the activity.

Questions 1-2

First, students graph a scatter plot of the Men's data. Use **Plot1** set up as shown at the right. To access the stat plot, press 2nd Y= ENTER.
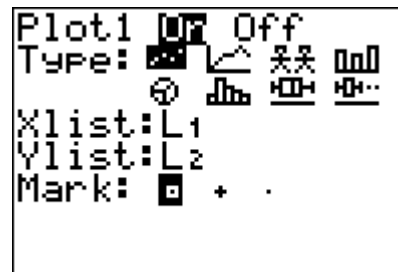
After setting up the stat plot, the window can be selected manually (press WINDOW) or by pressing ZOOM 7 (for **ZoomStat**).
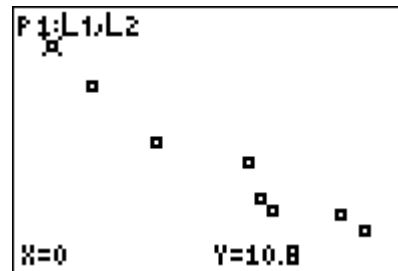
Question 3

After the graph is displayed, students will draw a manual-fit line of best fit. To draw the line, from a clear home screen press 2nd LIST ◄ 3. When the screen says **Manual-Fit**, press ENTER and you will return to the graph screen. Using the cursors, move to the location where you want the first point on the line and press ENTER. Then, move to where you want the second point on the line to be and press ENTER.
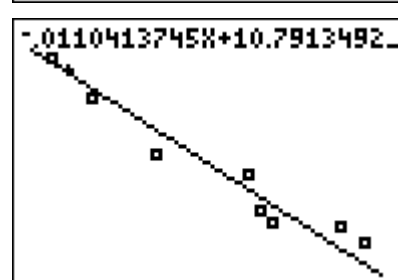
Once the line is drawn, students can use the left and right arrow keys (◄ and ►) to adjust the *y*-intercept and the up and down arrow keys (▼ and ▲) to adjust the slope. Have students record the equation of the line rounded to 4 decimal places.
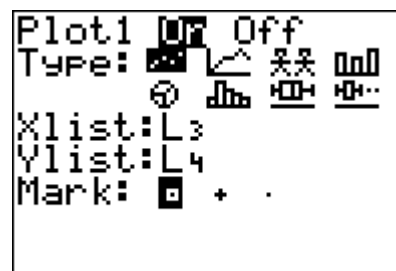
Questions 4-6

Students can use the manual-fit line and the graph to answer the given questions. You may want to have small groups of students compare their lines of best fit.

Problem 2 – Women's 100 Meter Dash

Questions 7-9

Next, students will complete the same exercise with the Women's data. This time, the stat plot should use L3 and L4.

If desired, you can have the students use **Plot2** and the data will be graphed at the same time as the Men's.

Questions 10-13

Students will again find the line of best fit manually by using the Manual-Fit regression type. If students have graphed both sets of data, make sure they use different marks (the last row of the stat plot setup) so they know which points belong in which group.
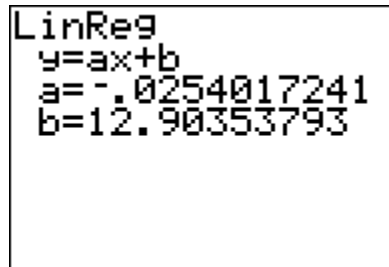

Problem 3 – Investigating Sample Size

<u>Questions 14-18</u>

After students have explored the use of the Manual-Fit regression, you may want to introduce them to the **LinReg(ax+b)** command. This will find the least-squares regression of best fit.

The key presses for the example at the right are
[2nd] [LIST] [◄] [5] to access **LinReg** command. Then,
[2nd] [1] [,] [2nd] [LIST] [2] to enter the lists used for the calculation. Then [,] [2nd] [APPS] [2] [1] to store the regression equation to Y1 for graphing. Press [ENTER] to execute.

Repeat for L3 and L4 to find the line of best fit for the Women's data.

```
LinReg
 y=ax+b
 a=-.0254017241
 b=12.90353793
```

Extension – TI-Navigator™

1. Open *MGAct28_Nav_01_TI73.act* to reveal a scatter plot of the Men's 100-M dash data. Start the activity and the data lists, L1 and L2, will be sent to students' calculators. Continue through the activity after students receive data.

2. Open *MGAct 28_Nav_02_TI73.act* to reveal the Women's 100-M dash data. Again, start the activity and the data lists, L3 and L4, will be sent to students' calculators.

3. **Screen Capture** can be used throughout the activity to monitor student progress

Solutions – student worksheet

Problem 1

1.
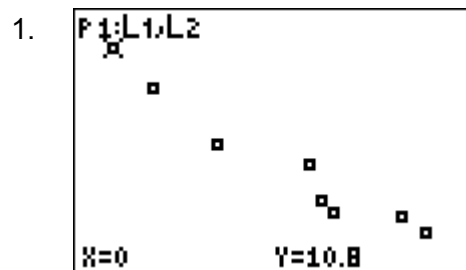
2. The times are getting faster as the years pass.

3. Answers will vary. Should be close to $y = -0.0097x + 10.7$

4. Check students' work. Sample: $y(100) = 9.73$ and $y(108) = 9.6524$.

5. Answers will vary. The expected times should match the regression equations found by the students. (substitute x and solve)

6. Students should realize that the line will continue to go towards zero but that runners will never be able to run the race in 0 seconds.

Problem 2

9.
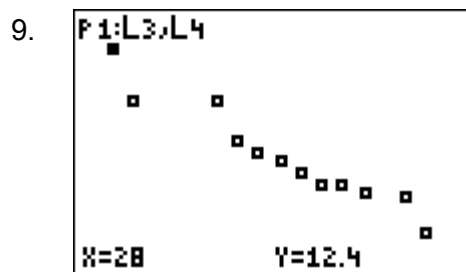
10. Answers will vary. Should be close to $y = -0.025x + 12.9$.

11. Check students' work. Sample: $y(92) = 10.6$ and $y(96) = 10.5$.

12. Answers will vary. The expected times should match the regression equations found by the students. (substitute x and solve)

13. Students may notice that the slope is greater for the women's times but it will not be likely that the women's times will pass the men's.

Problem 3

14. $y = -0.0097x + 10.7$

15. The equation for Question 14 should be close to the equation found in Question 3.

16. $y = -0.025x + 12.9$.

17. Again, the equation in Question 16 should be close to the equation found in Question 10.

18. Answers will vary. Possible responses may include that the manual-fit line is based on sight while the calculator's answer is based on actual calculation to make the best fit line.