

Exploring Linear Models

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Introduction

In this activity, students will create a scatter plot of Olympic data from the years 1948 to 1976, determine the line of best fit, and make a prediction. They will realize that the line of best fit is not valid for years before 1948 and after 1976.

Grades 9-12

NCTM Algebra Standards

- Use mathematical models to represent and understand quantitative relationships
- Draw reasonable conclusions about a situation being modeled

Files/Materials Needed

FreestyleL1.8xl, FreestyleL2.8xl, FreestyleL3.8xl, FreestyleL4.8xl, Olympic1.act, Olympic2.act

- 1** _____
- Launch TI-Navigator™ on the computer and start the session.
 - Have each student log into NavNet on their calculator.

- 2** _____
- Force send *FreestyleL1.8xl, FreestyleL2.8xl, FreestyleL3.8xl, and FreestyleL4.8xl* to the class. L1 and L2 data represents the winning times for the Olympics women's freestyle swimming event from 1948 to 1976 (1960 excluded). L3 and L4 data represents the winning times for the Olympics women's 400 meter freestyle swimming event from 1924 to 1988.

- 3** _____
- Have students logout of NavNet and create a scatterplot of L2 versus L1.
 - Use **Screen Capture** to check student understanding.

- 4** _____
- Have students log back into NavNet.
 - Load the activity settings file *Olympic1.act*.
 - Click the **List-Graph** tab. Click on **Configure Plots** and set X-List to L1 and Y-List to L2.
 - Start the activity and instruct students to press SEND. The student lists will be displayed as a scatter plot in Activity Center.

- 5** _____
- While still in Activity Center, change **Contribute** from Lists to Equations. Click **Configure** and select 1 equation per student. Also check each of the three boxes under Main Settings. Have students start with **Empty Equations**. Press OK.
 - Start the activity and instruct students to send the equation for the line of best fit using the points (1948, 5.3) and (1976, 4.16). Have them round all decimals to the nearest thousandth.

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- a. While the activity from Step 5 is still running, ask students to look at the plot on their own calculator. Have them estimate the winning time for the year 1964.
- b. Use **Quick Poll** (with *Open Response*) to collect answers to:
 - *Using the line of best fit, estimate the winning Olympic time for the year 1964 to the nearest tenth.*

The answer is about 4.6 minutes.

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- a. Load the activity settings file ***Olympic2.act***.
- b. Start the activity and instruct students to press **SEND**. The student lists will be displayed as a scatter plot in Activity Center. Explain to students that this is similar data that has been expanded to include the years 1924 to 1988.

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- a. Point out to students that the first four data points and the last three data points do not fall on the line of best fit.
- b. Use **Quick Poll** (with *Open Response*) to collect answers to:
 - *What is a reasonable domain for the line of best fit?*The answer is between 1948 and 1976.
- c. Discuss why the last three points do not fall near the line of best fit.
- d. Use **Quick Poll** (with *Agree Disagree*) to collect answers to:
 - *Based on the scatter plot, the winning time will never be less than 4 minutes.*