



Linear Modeling

Student Activity

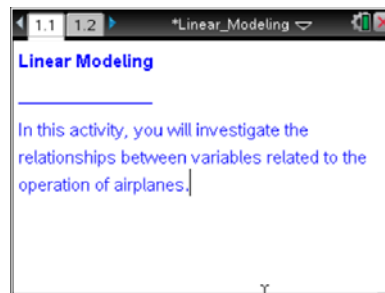


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




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Open the TI-Nspire document *Linear_Modeling.tns*.

In this lesson, you will investigate the relationships between variables related to the operation of airplanes. You will find the line of fit, interpret slopes and y-intercepts in context of the data, and make predictions based on lines of fit for the given data.



Move to page 1.2.

1. Construct a scatter plot for the number of passenger seats vs. the operation cost of an airplane:
 - a. Select *add variable* at the bottom of the page where the horizontal axis should be placed, and select the variable **seats**.
 - b. Select *add variable* on the left of the page where the vertical axis should be placed, and select the variable **op_cost_perhr**.
2. Explore the scatter plot and answer the following questions:
 - a. Describe the relationship between the number of seats and the operation cost per hour displayed in your graph.
 - b. Why might there be a relationship between the number of passenger seats and the operation cost of an airplane?
 - c. Describe a situation for which the data point (0, 4804) would make sense.
 - d. Explain why the data point (0, 4804) should or should not be used when fitting a line to the data.
3. To explore the relationship between the variables, add a movable line by following the handheld steps below:
 - Select **MENU > Analyze > Add Movable Line**. A line will appear on the screen.
 - Move your cursor until it is near what appears to be the end of the line. A  will appear.
 - Press **ctrl**  to grab the line and rotate it.
 - Press **esc** or  to release the line.
 - Move your cursor until it is near what appears to be the middle of the line. A  will appear.
 - Press **ctrl**  to grab the line and move it horizontally and vertically.
 - Move the line until you think it best represents the data. Press **esc**.



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Tech Tip: Select  > **Analyze** > **Add Movable Line**. To move a line graph, grab and hold either end of the line to rotate it. Grab and hold the middle of the line graph to move the entire line.

- a. What is the equation of your line?
 - b. What do the slope and y-intercept of the equation of your line represent in the context of this situation?
 - c. Estimate the operation cost per hour that might be used by an airplane carrying 200 passengers. Explain how you got your answer.
 - d. What other variables could affect the operation cost of an airplane?
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4. How is the operational cost per hour affected by the amount of fuel used per hour? To change the variables graphed along the x-axis, select the bottom of the page under the horizontal axis and select the variable **fuel_galperhr**.
 - a. Adjust the movable line to fit the data. What is the equation of your line of fit?
 - b. What is the y-intercept for your equation? What is the real-world meaning of the y-intercept of your graph?
 - c. What is the slope of your equation? What is the real-world meaning of the slope of your graph?
 - d. Using your line of fit, predict the number of gallons per hour used for a flight if the operating cost is \$3,500 per hour.



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5. And now, how is the operational cost per hour is affected by the flight length? To change the variables graphed along the x-axis, select the bottom of the page under the horizontal axis, and select the variable **flightlength_min**.
- Adjust the movable line to fit the data. What is the equation of your line of fit?
 - What is the y-intercept for your equation? What is the real-world meaning of the y-intercept of your graph?
 - What is the slope of your equation? What is the real-world meaning of the slope of your graph?
 - Using your line of fit, predict the operation cost for a 2-hr flight.