Linear Modeling

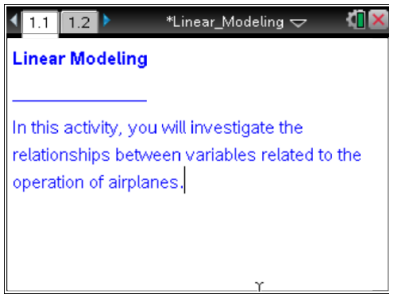
Student Activity

Name _____

Class _____

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.

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?

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.

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**.

   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 operation cost for a 2-hr flight.