

Name: _____ Date: _____ Section _____

Linear Regression Activity - Estimating Time

Overview:

Using linear regression and the TI-83/84, this lab activity will help you answer the following research question:

For short time frames (< 2 minutes), do you tend to overestimate or underestimate time?

Learning Objectives:

1. Collect, analyze, and interpret bivariate data.
2. Use the the TI-83/84 to construct scatterplot, calculate a least-squares regression line, and construct and interpret residual plot.
3. Interpret slope of least-squares regression line in the context of the problem.

Required Material:

1. Stopwatch (cellphone or visit: www.timeanddate.com/stopwatch/)

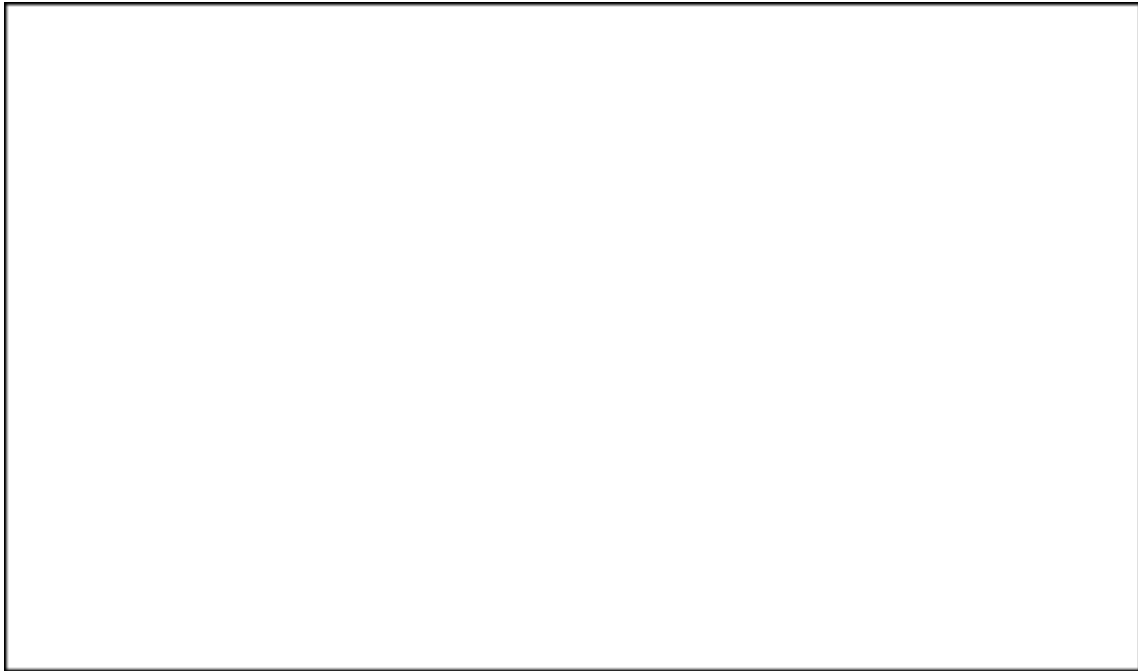
Part A - Data Collection

Instructions: Working with your partner, hand your sheet of paper to him/her so that he/she can collect and record your guessed time under the *Guessed Time* column. During this activity, make sure that the student guessing elapsed time is unaided. Leave *Predicted Time* and *Residual* columns blank for now.

Time (x)	Guessed Time (y)	Predicted Time (y-hat)	Residual
5 seconds			
50 seconds			
20 seconds			
10 seconds			
30 seconds			
40 seconds			

PART B - TI-83/84 DATA ANALYSIS

1. Enter your *Time* and *Guessed Time* data into your TI-83/84 and construct a scatterplot. Sketch your scatterplot below. Make sure to label the main title, x-axis and y-axis below.



2. Using your TI-83/84, calculate the correlation between *Time* and *Guessed Time*.

$r =$ _____

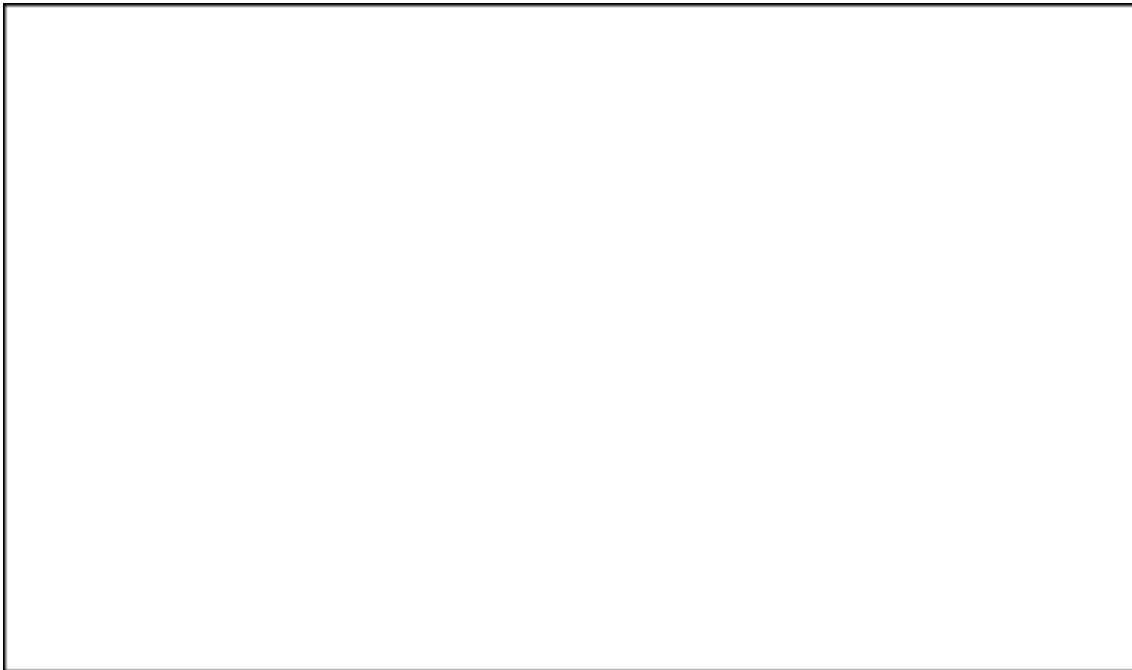
3. Using your TI-83/84, calculate the equation of the least squares regression line.

4. In the TI-83/84, add the least squares regression line to the scatterplot. Then add the least squares regression line to your scatterplot above.

5. When *Time* equals 5 seconds, calculate the *Predicted Time* (y -hat) value. Add the value to the datasheet on the previous page. Show calculation below:

6. By hand, calculate the residual when $x=5$. Add the value to the datasheet on the previous page. Show calculation below:

7. Have the TI-83/84 calculate all the residuals and use the data to fill in the residuals column on the data table. Then have the TI-83/84 construct a residual plot. Sketch the residual plot below:



8. Based on the fitted scatterplot in #1, and the residual plot above, does it appear as if the linear model is a good fit for your data? Explain why or why not.

9. What does the slope of the least-squares regression line represent in the context of this problem?

10. Based on your data, and the fitted least-squares regression line, do you tend to overestimate or underestimate time in the short term? Explain your answer.

11. Who tends to be better at estimating elapsed time in the short term, you or your partner? Justify your answer.

12. Now, you and your partner both need to complete one more time estimate of 15 seconds. Place your guessed time below:

Guessed time: _____

13. Based on the least-squares regression equation from #3, predict what your guessed time would be for question #12. Show calculation below. Was the predicted time close?

14. Below, write a reflection about what you learned from today's lab activity.