Name _____ Block _____ Date _____

Fitting a Line to Data Open Response Question

Answer questions completely on a separate piece of graph paper, making sure to explain your thinking.

A large company is expanding its workforce and needs to hire some new administrative assistants. The company wants to know what the relationship is between the amount of experience that its current administrative assistants possessed when they were hired and their starting salary with the company. The data for ten randomly selected administrative assistants is given below.

Experience (in months)	Starting Salary (in $1000)
4	25
13	34
3	22
0	21
10	33
7	27
22	38
15	35
5	26
20	36

a. What kind of the relationship would you expect between length of experience and starting salary for the randomly selected administrative assistants?

b. Construct a scatterplot of the data.
Which variable should be the independent variable and which is the dependent variable?
Remember to include scales and labels for your axes.

c. Does the scatterplot confirm your description in Part (a)? Explain your answer.

d. Suppose you wanted to hire an administrative assistant who had 17 months experience. Predict what the starting salary would be. Describe how you used the scatterplot to help you.

Since there seems to be an almost linear relationship between starting salary and amount of job experience in months, a line can be drawn on the scatterplot to summarize this relationship. Such a line helps us to predict the value of the variable on the vertical axis (the dependent variable) from the value of the variable on the horizontal axis (the independent variable).

On your scatterplot in part (b), draw a line that you think summarizes or fits the data. This line should go through the middle of the set of data points.

e. Use the line you drew to predict the approximate starting salary for an assistant with 12 months experience.

f. According to the data, the actual salary of an assistant with 12 months experience was $33,000. How close was your prediction? Calculate this by subtracting the predicted value from the actual value. This difference in called a residual. Did you over-predict or under-predict your estimate? Justify your answer.

g. Instead of using the graph of the fitted line to predict a starting salary based on experience, you can use an equation for the line to do it. Pick two ordered pairs on the line you drew on the scatterplot of length of experience and starting salary. Use your ordered pairs to write an equation of the line. Write your answer in the form of y = mx + b. (Make sure to show all work.)

h. What does the variable y in your equation represent in the context of the problem?

i. What does the variable x represent in your equation?

j. What is the slope of this line? Interpret the slope in the context of this problem.

k. Use your equation from part (g) to predict the starting salary for an assistant who has 17 months experience.

l. Compare your prediction from part (k) to your estimate from the scatterplot in part (d). Are they reasonably close? Do you think having the equation for the fitted line makes it easier to predict a value? Explain your answer.

Open Response Grading Rubric

Grade	Description of Work
4 - A	Thinking clearly explained by: • describing steps used to solve problem • including specific math vocabulary • including words from the question Work clearly shown through computations, diagrams, or tables/charts All parts of the answer are labeled if needed (“a” “b”) Answer/Computations are correct with proper units
3 - B	Thinking clearly explained by: • describing steps used to solve problem • including some math vocabulary • including words from the question Some work shown through computations diagrams, or tables/charts Parts of the answer are labeled (“a” “b”) Computations are correct, units missing
2 - C	Explanation is not clear, little writing Minimal math vocabulary Steps to solve problem are out of order Work not shown, or work is difficult to follow All parts of the question not answered Computations and/or answer are incorrect
1 - D	Minimal explanation of thinking Incorrect or no math vocabulary used Directions not followed Computations and answer are incorrect
0 - F	No explanation of thinking Answer is not related to the question No work shown Blank