The Wave

Directions: Show all computational work in the space provided and write descriptive answers in complete sentences.

1. Describe the procedure used to collect the data.

2. Data Collection:

Number of People	Seconds to Complete the Wave

3. Points to be graphed:

x	y

4. Do a scatterplot of your data on graph paper. Use a ruler to draw the x-axis and y-axis, and label and scale both axes so that your scatterplot will fill most of the paper. **Do not connect your points**. Is your data approximately linearly related?

5. We want to approximate our data using a line. Use the spaghetti strand to experiment with until you have found a line that you feel represents the data the best. Pick two data points that lie closest to the line. Write the coordinates of the points you chose below:

Your points: (,) and (,)

6. Explain briefly how you chose the line and two points in the previous step. Why do you feel it was the best line to choose?

7. You need to now find the equation of your linear model. Use the two points you chose in step 5. to find the slope of your line. Express your slope as a decimal, accurate to two decimal places. Show your work below. *The formula for the slope of a line is:* $m = \frac{y_2 - y_1}{x_2 - x_1}$

8. Now you need to find the y-intercept. *Pick one of your points and plug it and the slope you calculated into* $y = mx + b$. Calculate the y-intercept, b, of your line, accurate to 2 decimal places.

9. Write the equation of your line in the space below.

_____=_____

10. Now graph the line on your scatterplot. To do this, complete the table below using the equation of your line in the previous step. Then plot these three points on your scatterplot and connect them with a line. Use a different color pen or pencil, and use a ruler. Is the line a good linear model for the data?

x	**y**
0	
10	
20	

11. Write a sentence saying what the slope represents in terms of number of people and seconds to do the wave. What units would you use?

12. Write a sentence stating what the y-intercept represents in terms of the problem.

You will now use the equation of your line to answer the following questions. Show all work to calculate these answers.

13. How long would it take 200 students to complete the wave?

14. How many students are needed for a 45 second wave?

15. Was your answer to question 13 a whole number? Does a non-whole number answer make sense? Explain.

16. How many students are required for a three **minute** wave?

17. What is the x-intercept for your line? What does it represent in terms of the situation? Has model breakdown occurred? Explain. *Model breakdown is a situation in which the model yields a result which does not make sense in the context of the situation.*