



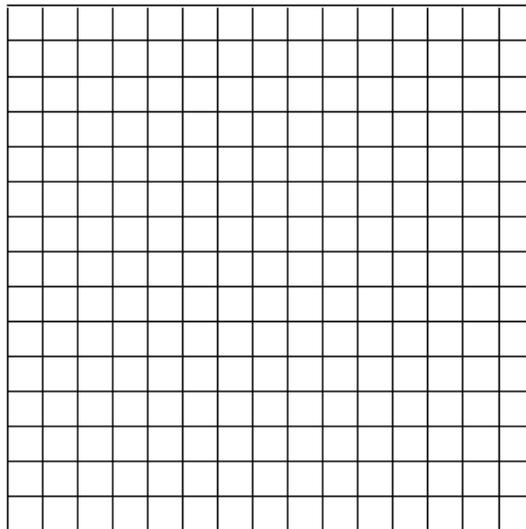
Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

### Linear Regression

1) A biologist is studying the relationship between a tree's diameter and its height. She records the following data for 7 different trees.

Diameter (inches)	2	3	4	5	6	7	8
Height (feet)	8	10	16	17	22	20	29

- On the grid provided, create a scatterplot of the data. Use the diameter as the independent variable.
- Draw a line of best fit through the data. As a guide, try to have as many points of data fall above the line as below the line.
- Write two ordered pairs that lie on your line.
- Determine the equation of your linear function using the two ordered pairs from part (c).



e) Using your linear function, estimate, to the nearest foot, the height of a tree given that its diameter is 10 inches.

**Exercise #2:** Consider the same data that you had before:

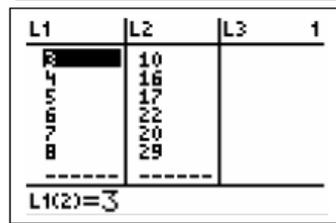
Diameter (inches)	2	3	4	5	6	7	8
Height (feet)	8	10	16	17	22	20	29

(a) Enter the data into your calculator as follows.

**Step 1** – Hit the **STAT** button and go to the **Edit** submenu.



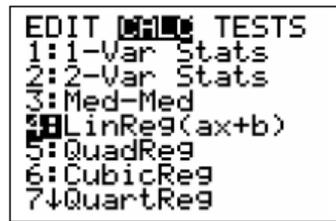
**Step 2** – Enter the Diameters under **L1** and the Heights under **L2**. When working with a data set, always place the independent variable in **L1** and the dependent variable in **L2**.



(b) Find the equation for the line of best fit. Round your coefficients to the nearest *tenth*. Also, define what each variable,  $x$  and  $y$ , represent.

**Step 1** – Hit the **STAT** button and go to the **CALC** submenu.

**Step 2** – Go the choice 4 – **LinReg(ax+b)**. Hit **ENTER** twice.



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LinReg
y=ax+b
a=3.178571429
b=1.535714286

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(c) To the nearest foot, use this equation to find the height of a tree whose diameter is 10 inches.

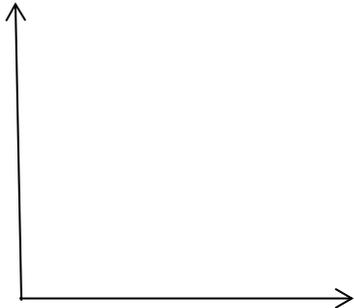
(d) How close is this to your value in problem #1?

3) A real-estate agent is trying to determine the relationship between the distance a 3-bedroom home is from New York City and its average selling price. He records data for 6 homes shown below.

Miles from New York City, <i>x</i>	10	35	50	65	75	120
Price of 3 Bedroom Home, <i>y</i>	755,000	650,000	580,000	505,000	475,000	285,000

a) Using your calculator, graph the scatterplot for the data and sketch it on the axes.

b) Find the correlation coefficient and interpret it below.

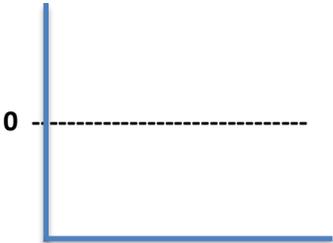


c) Find the LSRL. \_\_\_\_\_

d) Interpret the meaning of the slope in the context of this problem.

e) Using your model, estimate the price of a 3 bedroom home 100 miles from New York City.

f) Graph the residual plot in the calculator. Sketch it below. Comment on the appropriateness of this linear model using your residual plot.



4) Biologists have observed that the chirping rate of crickets of a certain species appears to be related to temperature. The table shows the chirping rates for various temperatures.

Temperature (°F)	Chirping Rate (chirps/min)
50	20
55	46
60	79
65	91
70	113
75	140
80	173
85	198
90	211

a) Plot the data in your calculator. Describe the scatterplot using the words we have learned in class.

b) In plain language, what does the scatterplot reveal about the two variables.

c) Find the correlation coefficient and interpret it.

d) Find the regression line. \_\_\_\_\_

e) Interpret the slope of your model in context.

f) Interpret the y-intercept of your model in context.

g) Graph the residual plot in your calculator. Sketch it below and comment on the appropriateness of the linear model.

