

## Linear Regressions

Objective: Students will use technology and prior knowledge to analyze linear data and make predictions.

### Prep Your Graphing Calculator:

Clear your  $y =$

Turn your plots off ( $2^{\text{nd}}$  →  $y =$  → 4 → Enter)

Screen should say “done.”

### Enter Your Data

Clear data in all lists (Stat → Edit → Use the enter button and arrows to enter the data)

### Graph

Turn plot on ( $2^{\text{nd}}$  →  $y =$  → enter → duplicate screen)

(Once this is done, this step can be skipped.)

Zoom 9 (Does it appear linear?)

### Calculate Equation

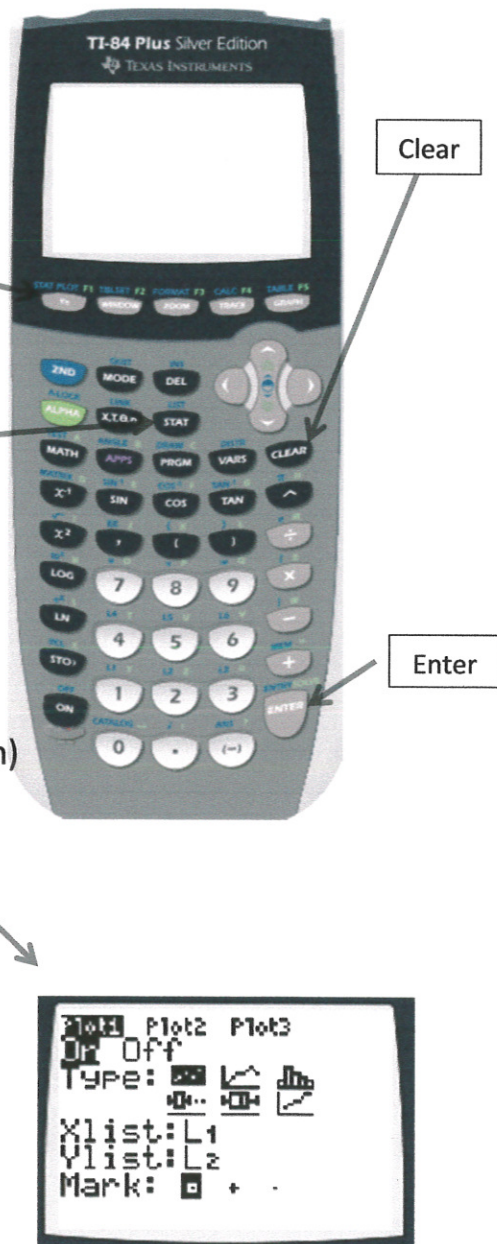
Stat → Calc → 4 → Press enter until the equation appears (Round to the nearest hundredth)

### Test Your Equation

$y =$  type your equation → graph

(Does it seem to be a line of best fit, which goes with the flow of the data, having approximately the same number of points above the line as below?)

\*Back to Main Screen  $2^{\text{nd}}$  → Mode

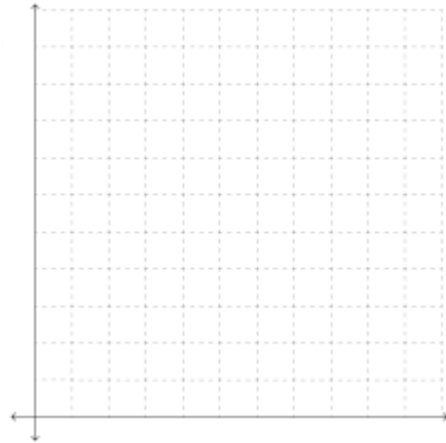


Complete the following exercises with a partner. If you forget steps, refer back to the **Teacher Blacklines**.

- Christy collected the following data for a class project by timing a friend doing sit-ups.

#Seconds	7	11	15	20	26	30	35	40	43	47
#Sit-ups	6	9	11	15	21	17	22	27	29	32

- Enter the data and graph the corresponding points in your graphing calculator. Does it follow a linear trend?
- Sketch your graph and give your window settings out to the side.

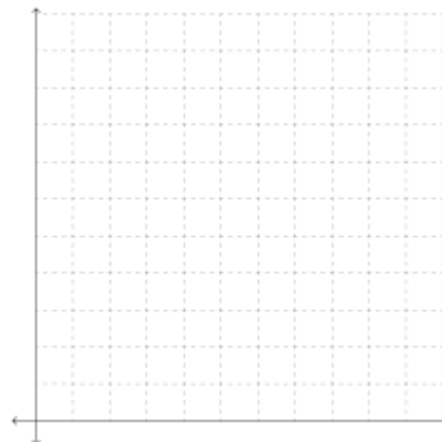


- Determine the linear regression equation for your data and sketch its path on the above graph. Round to three decimal places.
- If Christy's friend does 60 sit-ups, approximately how long will it take?
- If Christy's friend does sit-ups for one minute, approximately how many sit-ups will he/she do?
- Based on your equation, approximately how many sit-ups is the friend doing each second?

2. This table shows the number of seats on various types of airplanes, and their operating costs per hour. *Source: The World Almanac and Book of Facts 1994.*

#Seats	Cost per hour
403	7,098
293	4,072
266	3,917
224	3,384
188	2,293
148	2,263
131	1,768
112	1,735
77	1,439

- a. Enter the data and graph the corresponding points in your graphing calculator. Does it appear to be linear?
- b. Sketch the graph and give the window setting for your calculator below.



- c. Determine the linear regression model which would express cost as a function of the number of seats on a plane.
- d. Use your equation to determine the cost per hour of flying a plane with 60 seats.
- e. If the plane costs approximately \$7,236.96 per hour to fly, about how many seats are on the plane?
- f. According to your equation, about how much is it costing per hour for each additional seat on a plane?

Name: \_\_\_\_\_

Hour: \_\_\_\_\_

1. Answer each part below.

### Gym Membership

The graph models the total cost of joining a gym. Write an equation of the line. Explain the meaning of the slope and the  $y$ -intercept of the line.



Equation: \_\_\_\_\_

Slope Represents: \_\_\_\_\_

Y-Intercept Represents: \_\_\_\_\_

2. In a certain lake, a 1 year old bluegill fish is 3 inches long, while a 4 year old bluegill fish is 6.6 inches long.

a) Assuming that the growth rate is always the same, write an equation for the length  $l$  of a bluegill fish in inches after  $t$  years.

b) How long would you expect this type of fish to be after 3 years?

3. There is a linear relationship between education level and income. The following data was collected by the U.S. Bureau of Labor Statistics for the year 2011. For a high school graduate, who has zero years of post-high school education, the median weekly earning is \$638. For an individual with a bachelor's degree, who has about 4 years of post-high school education, the median weekly earning is \$1,053.

a) Write an equation for the weekly earning  $y$  for an individual with  $x$  years of post-high school education.

b) About how much money would someone make per week after 6 years of post-high school education, which is traditionally considered a master's degree?

**Find the slope intercept equation of the line by hand. Use graphing technology to confirm your answer.**

1) (2, 3) and (3, 5)

**Use graphing technology to write the equation of each line in slope intercept form. What is not finished in class may be completed by hand.**

2) through: (1, 1) and (0, -1)

3) through: (1, -1) and (0, 4)

4) through: (4, -3) and (0, 1)

5) through: (-1, 4) and (0, -2)

6) through: (-2, -2) and (0, 0)

7) through: (1, 3) and (0, -1)

8) through: (1, 3) and (0, 1)

9) through: (0, 2) and (-4, 1)

10) through: (-1, 0) and (0, 1)

11) through: (0, -2) and (3, -3)