

8 Algebra CC

Essential Question: How can we use our graphing calculator to determine the linear regression equation for a set of bivariate data?

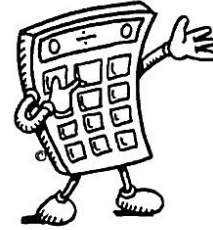
Do Now: Refer to last night's HW.

Write the equation of your trend line here: $y = 12x - 4$

Using the Graphing Calculator to find the Linear Regression Equation

*One-time process (or after the calculator has been reset)

- 2nd 0 (CATALOG)
- Scroll down to DIAGNOSTICS ON
- ENTER, ENTER
- Mode
- Arrow Up ↑
- Stat Diagnostics ON



I. Enter the bivariate data into List 1 (L₁) and List 2 (L₂)

1. STAT #1 (EDIT)
2. List distance into L₁ and time into L₂

II. Creating the Scatter Plot

3. 2nd y = (STAT PLOT) #1 ENTER
4. Turn On and Choose Scatter Plot
5. ZOOM #9 (ZOOM STAT)

III. Determining the Linear Regression Equation

6. STAT arrow over to CALC #4 (LinReg (ax + b))

Fill in the following information from your calculator.
LinReg(ax + b)

$a = 11.42241379$ slope
 $b = -3.77586$ y-intercept
 $r = .97319192$ correlation coefficient

How do we graph the trend line on the calculator?

- 1) Press y =
- 2) Enter equation in y₁
- 3) Press Graph

Linear Regression Equation: $y = 11.422x - 3.776$

Discussion Question: How is this information from our calculator useful?

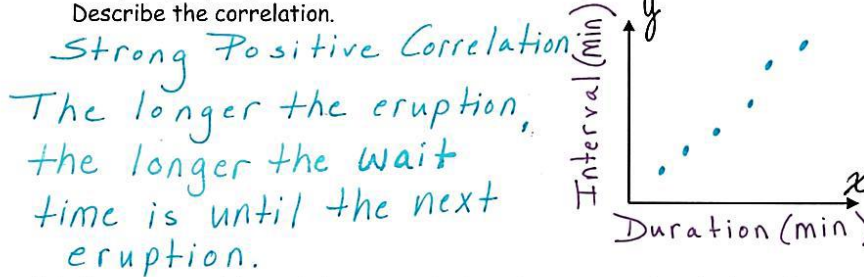
The equation can help us predict information (interpolate and extrapolate).

Examine the data in the table below and complete a - d.

The table below shows the duration of several eruptions of the geyser Old Faithful and the interval between eruptions.

x	Duration (minutes)	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
y	Interval (minutes)	50	57	65	71	76	82	89	95

(a) Use your graphing calculator to create a scatter plot for the data. Sketch the graph below. Describe the correlation.



(b) Use your graphing calculator to calculate the equation for the line of best fit.

a: 12.64285
b: 32.03571

$$y = 12.643x + 32.036$$

(c) What is the correlation coefficient? What does it say about the data?

$r = .998651482$ Very Strong Positive Correlation

(d) If the geyser erupted for 7 minutes, predict the amount of time that would pass before the next eruption occurred.

(x, y)
duration interval

$$y = 12.643(7) + 32.036$$

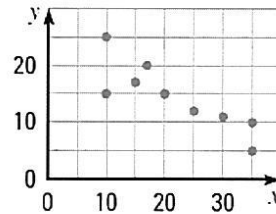
$$y = 120.537...$$

TAKEAWAY

$\approx 120 \frac{1}{2}$ minutes (2 hours and 30 seconds)

Which equation best models the data in the scatter plot?

- A $y = 15$ B $y = -\frac{1}{2}x + 26$
 C $y = -\frac{2}{5}x + 19$ D $y = -\frac{4}{5}x + 33$



Our calculator can help us summarize a set of data by determining the equation of the trend line (linear regression model). We can use this equation to make predictions (*interpolate and extrapolate*).

Use your graphing calculator to sketch a scatter plot of the data represented in the table below.

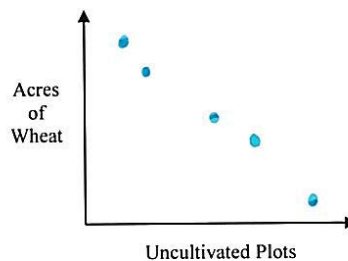
Uncultivated Plots	1	2	4	5	8
Acres of Wheat	225	195	155	146	75

A. What is the correlation coefficient? Describe the correlation.

Correlation Coefficient: $-.9953$

Description:

Very close to -1
strong negative
correlation



B. Using your graphing calculator, determine the linear regression equation.

Equation: $y = -20.63x + 241.73$

C. Using your equation, predict the number of acres that would exist if there were 4.5 uncultivated plots.

$$y = -20.63x + 241.73$$

\rightarrow Acres of wheat
 \uparrow # of uncultivated plots

$$y = -20.63(4.5) + 241.73$$

$$y = 148.895$$

We would expect about 149 acres of wheat to exist if there were 4.5 uncultivated plots.