

# STUDYGUIDE

Algebra II Academic

Name \_\_\_\_\_

Section 2.7 - Curve Fitting with Linear Models

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

The table shows the population and the cost of living in 10 selected American cities.

City	1990 Population (100,000s)	1993 Cost of Living Index (%)
Boston, MA	5.74	137.1
San Diego, CA	11.10	128.5
Minneapolis, MN	3.68	102.4
Houston, TX	16.30	99.4
Omaha, NE	3.32	92.9
Dallas, TX	10.06	105.2
Seattle, WA	5.16	119.7
Toledo, OH	3.33	101.6
Denver, CO	4.68	105.1
Atlanta, GA	3.94	101.5

- A. Using your calculator, write a linear regression equation that relates the 1990 population ( $x$ ) to the 1993 Cost of Living Index ( $y$ ). Round your coefficients to the nearest hundred.

$$y = .384x + 106.755$$

Put in  $y_1$

$$y_1 = .3840974127x + 106.7546403$$

(zoom 9)

- B. What is the correlation coefficient and what does it tell you about the data?

$$r \approx .117$$

There is little correlation in the data.

- C. In 1990, Pittsburgh's population was 3.69 (100,000s). Using your linear model from part (a), determine the cost of living index for Pittsburgh in 1993.

$$x = 3.69$$

$$108.172\%$$

- D. Using your model, determine the population of Fort Lauderdale in 1990 if the cost of living index in 1993 was 108.9.

$$y_2 = 108.9$$

$$5.585 \text{ thousand}$$

- E. What is the meaning of the slope in your linear regression equation?

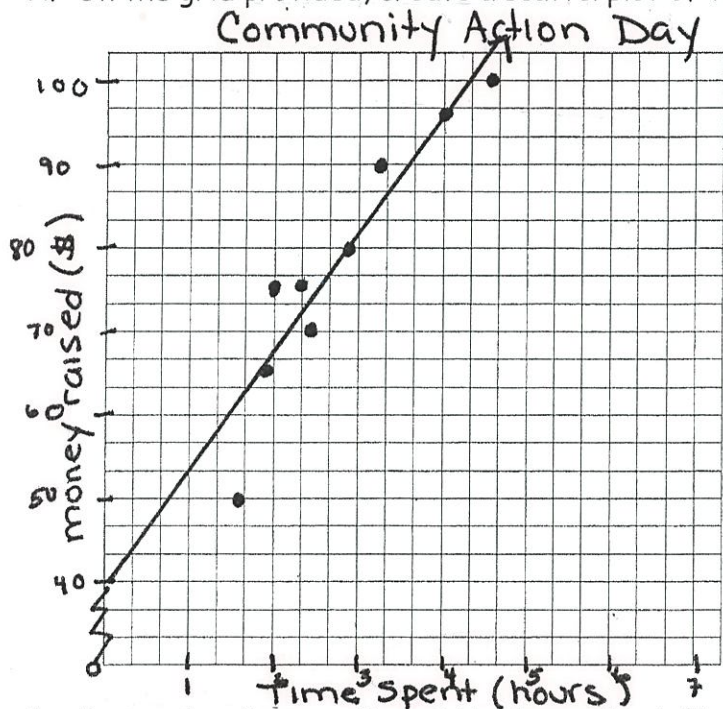
$$\frac{\Delta y}{\Delta x} = \frac{.384}{1}$$

As the population increases by 1, the cost of living index increases by .384

2. The table shows the times spent by nine participants in a Community Action Day, and the amounts of money they raised.

Time Spent (Hours)	1.5	2.3	2.4	2.8	1.8	2.0	3.2	4.0	4.5
Money Raised (\$)	50	75	70	80	65	75	90	95	100

A. On the grid provided, create a scatterplot of the data. Draw a line of best fit through the data.



$x = \text{time spent (hours)}$   
 $y = \text{money raised (\$)}$

Use points:  
 $(2.8, 80)$   $(1.8, 65)$

B. Determine the equation of the line of best fit. (BY HAND)

$$m = \frac{65 - 80}{1.8 - 2.8} = 15$$

option 1 (use  $y = mx + b$ )

$$(1.8, 65) \quad m = 15$$

$$65 = 15(1.8) + b$$

$$65 = 27 + b$$

$$b = 38$$

$$y = 15x + 38$$

option 2 (Point-Slope)

$$y - y_1 = m(x - x_1)$$

$$(1.8, 65) \quad m = 15$$

$$y - 65 = 15(x - 1.8)$$

$$y - 65 = 15x - 27$$

$$+65 \quad +65$$

$$y = 15x + 38$$

C. If a student works for 5 hours, how much money should they expect to raise?

$$x = 5$$

$$y = 15(5) + 38$$

$$\boxed{\$113}$$

D. If a student raises \$72, about how many hours did they work?

$$y = 72$$

$$72 = 15x + 38$$

$$34 = 15x$$

$$\boxed{2.267 \text{ hours}}$$

E. What is the meaning of the slope in your linear regression equations?

$$\frac{\Delta y}{\Delta x} = \frac{15}{1}$$

As the number of hours increases by 1, the amount of money increases by \$15.

F. Would you expect the correlation coefficient to be between 0 and -1 or between 0 and 1? What is the meaning of the correlation coefficient?

0 & 1 → strong positive correlation