



# Graphing Calculator

A Follow-Up of Lesson 5-7

Sharp EL-9900

## Regression and Median-Fit Lines

One type of equation of best-fit you can find is a linear **regression equation**.

**EARNINGS** The table shows the average hourly earnings of U.S. production workers for selected years.

Year	1960	1965	1970	1975	1980	1985	1990	1995	1999
Earnings	\$2.09	2.46	3.23	4.53	6.66	8.57	10.01	11.43	13.24

Source: Bureau of Labor Statistics

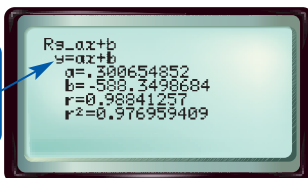
Find and graph a linear regression equation. Then predict the average hourly earnings in 2010.

### Step 1 Find a regression equation.

- Enter the years in L1 and the earnings in L2.  
**KEYSTROKES:** Review entering a list on page 204.
- Find the regression equation by selecting Rg\_ax+b on the STAT REG menu.

**KEYSTROKES:** [D] 02

The equation is in the form  $y = ax + b$ .



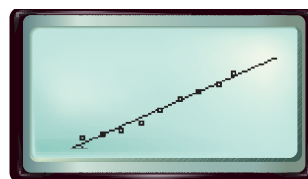
The equation is about  $y = 0.30x - 588.35$ .

$r$  is the **linear correlation coefficient**. The closer the absolute value of  $r$  is to 1, the better

the equation models the data. Because the  $r$  value is close to 1, the model fits the data well.

### Step 2 Graph the regression equation.

- Use STAT PLOT to graph the scatter plot.  
**KEYSTROKES:** Review statistical plots on page 204.
- Copy the equation to the Y= list and graph.  
**KEYSTROKES:** [VARS] [H] [B] 1

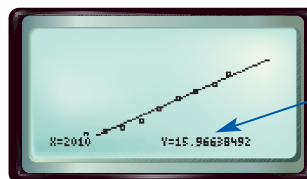


[1950, 2010] scl: 10 by [0, 20] scl: 5

### Step 3 Predict using the regression equation.

- Find  $y$  when  $x = 2010$  using value on the CALC menu.  
**KEYSTROKES:** [CALC] 1 2010

According to the regression equation, the average hourly earnings in 2010 will be about \$15.97.



The graph and the coordinates of the point are shown.

# Investigation

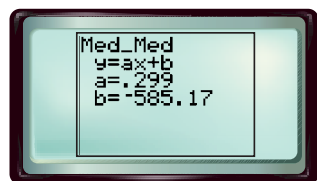
A second type of best-fit line that can be found using a graphing calculator is a **median-fit line**. The equation of a median-fit line is calculated using the medians of the coordinates of the data points.

Find and graph a median-fit equation for the data on hourly earnings. Then predict the average hourly earnings in 2010. Compare this prediction to the one made using the regression equation.

## Step 1 Find a median-fit equation.

- The data are already in Lists 1 and 2. Find the median-fit equation by using Med-Med on the STAT REG menu.

KEYSTROKES: CL STAT ALPHA [D]  
01 ENTER

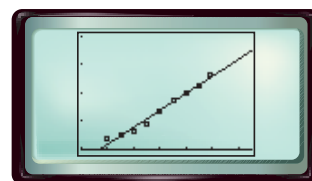


The median-fit equation is  $y = 0.299x - 585.17$ .

## Step 2 Graph the median-fit equation.

- Copy the equation to the Y= list and graph.

KEYSTROKES: F [VARS] ALPHA [H]  
ENTER ALPHA [B] 1 GRAPH

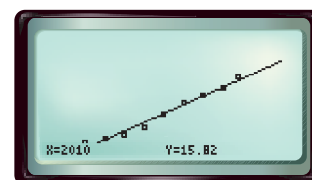


[1950, 2010] scl: 10 by [0, 20] scl: 5

## Step 3 Predict using the median-fit equation.

KEYSTROKES: F [CALC] 1 2010 ENTER

According to the median-fit equation, the average hourly earnings in 2010 will be about \$15.82. This is slightly less than the predicted value found using the regression equation.



## Exercises

Refer to the data on bald eagles in Example 2 on pages 300 and 301.

- Find regression and median-fit equations for the data. **1–5. See margin.**
- What is the correlation coefficient of the regression equation? What does it tell you about the data?
- Use the regression and median-fit equations to predict the number of bald eagle pairs in 1998. Compare these to the number found in Example 3 on page 301.

For Exercises 4 and 5, use the table that shows the number of votes cast for the Democratic presidential candidate in selected North Carolina counties in the 1996 and 2000 elections.

- Find regression and median-fit equations for the data.
- In 1996, New Hanover County had 22,839 votes for the Democratic candidate. Use the regression and median-fit equations to estimate the number of votes for the Democratic candidate in that county in 2000. How do the predictions compare to the actual number of 29,292?

1996	2000
14,447	16,284
19,458	19,281
28,674	30,921
31,658	38,545
32,739	38,626
46,543	52,457
49,186	53,907
69,208	80,787
103,429	126,911
103,574	123,466

Source: NC State Board of Elections