EXTEND 4-6

## Graphing Calculator Lab

# Regression and Median-Fit Lines

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

### ACTIVITY 1

**MUSIC** **The table shows the percent of music sales that were made on the Internet in the United States for the period 1997–2004.**

| Year | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|---|---|---|
| Sales | 0.3 | 1.1 | 2.4 | 3.2 | 2.9 | 3.4 | 5.0 | 5.9 |

**Source:** Recording Industry Association of America

**Find and graph a linear regression equation. Then predict the percent of music sales that will be made on the Internet in 2010.**

**Step 1** **Find a regression equation.**

Enter the years in L1 and the earnings in L2. Find the regression equation.

**KEYSTROKES:** STAT ENTER 1997 ENTER … ▶ 0.3 ENTER … STAT ▶ 4 ENTER


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

The equation is about $y = 0.73x - 1459.25$.

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

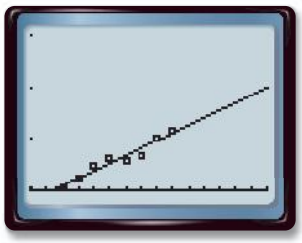
**Step 2** **Graph the regression equation.**

Use STAT PLOT to graph the scatter plot.

**KEYSTROKES:** 2nd [STAT] ENTER ENTER

Copy the equation to the Y= list and graph.

**KEYSTROKES:** Y= VARS 5 ▶ ▶ 1 GRAPH



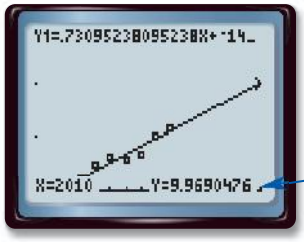
[1995, 2010] scl: 1 by [0, 15] scl: 5

**Step 3** **Predict using the regression equation.**

Find $y$ when $x = 2010$.

**KEYSTROKES:** 2nd [CALC] 1 2010 ENTER

According to the regression equation, in 2010 about 9.97% of music sales will be made on the Internet.




The graph and the coordinates of the point are shown.



Math online **Other Calculator Keystrokes at algebra1.com**

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.

## ACTIVITY 2

**Find and graph a median-fit equation for the data on music sales. Then predict the percent of sales that will be made on the Internet 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 CALC menu.

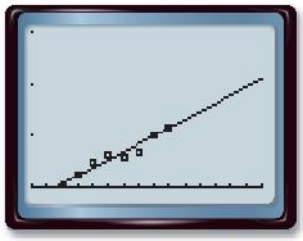
KEYSTROKES: STAT ▶ 3 ENTER


The median-fit equation is $y = 0.78x - 1557.34$.

**Step 2** **Graph the median-fit equation.**

Copy the equation to the Y= list and graph.

KEYSTROKES: Y= CLEAR VARS 5 ▶ ▶ 1 GRAPH

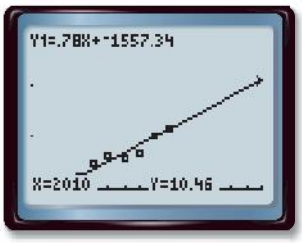


[1995, 2010] scl: 1 by [0, 15] scl: 5

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

KEYSTROKES: 2nd [CALC] 1 2010 ENTER

According to the median-fit equation, about 10.46% of music sales will be made on the Internet in 2010. This is slightly more than the predicted value found using the regression equation.




## ANALYZE THE RESULTS

**Refer to the data on roller coasters in Example 2 on page 229.**

1. Find regression and median-fit equations for the data.

2. What is the correlation coefficient of the regression equation? What does it tell you about the data?

3. Use the regression and median-fit equations to predict the largest vertical drop for a roller coaster in 2007. Compare these to the number found in Example 3 on page 230.