

5.7 Predict with Linear Models

TEKS

A.1.B, A.1.E,
A.2.D, A.6.E

Before

You made scatter plots and wrote equations of lines of fit.

Now

You will make predictions using best-fitting lines.

Why?

So you can model trends, as in Ex. 21.



Key Vocabulary

- best-fitting line
- linear regression
- interpolation
- extrapolation
- zero of a function

The line that most closely follows a trend in data is called the **best-fitting line**. The process of finding the best-fitting line to model a set of data is called **linear regression**. You can perform linear regression using technology. Using a line or its equation to approximate a value between two known values is called **linear interpolation**.

EXAMPLE 1 Interpolate using an equation

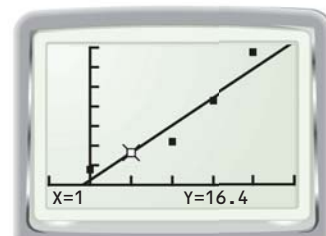
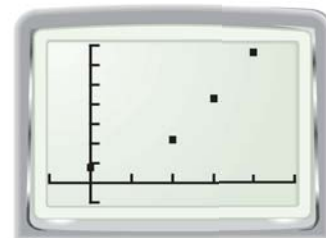
CD SINGLES The table shows the total number of CD singles shipped (in millions) by manufacturers for several years during the period 1993–1997.

Year	1993	1995	1996	1997
CD singles shipped (millions)	7.8	22	43	67

- Make a scatter plot of the data.
- Find an equation that models the number of CD singles shipped (in millions) as a function of the number of years since 1993.
- Approximate the number of CD singles shipped in 1994.

Solution

- Enter the data into lists on a graphing calculator. Make a scatter plot, letting the number of years since 1993 be the x -values (0, 2, 3, 4) and the number of CD singles shipped be the y -values.
- Perform linear regression using the paired data. The equation of the best-fitting line is approximately $y = 14x + 2.4$.
- Graph the best-fitting line. Use the *trace* feature and the arrow keys to find the value of the equation when $x = 1$.



- ▶ About 16 million CD singles were shipped in 1994.

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REVIEW REGRESSION

For help with performing a linear regression to find the best-fitting line, see p. 332.

ANOTHER WAY

You can also estimate the number of CDs shipped in 1994 by evaluating $y = 14x + 2.4$ when $x = 1$.