

Lesson 2-5

Example 1 Draw a Scatter Plot

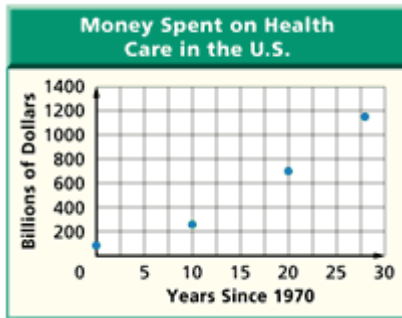
HEALTH The table below shows the total amount of money spent on health care, in billions of dollars, for the years 1970 through 1998. Make a scatter plot of the data.

alg2_020501.gif

Year	1970	1980	1990	1998
Billions of \$	73.2	247.3	699.4	1149.1

Source: *The World Almanac*

Graph the data as ordered pairs, with the number of years since 1970 on the horizontal axis and the amount of money on the vertical axis.

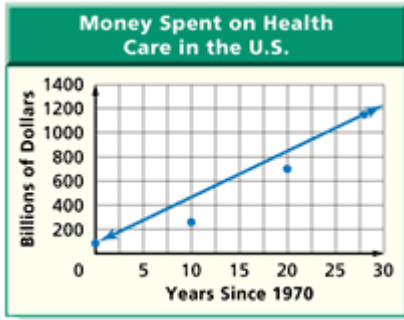


Example 2 Find and Use a Prediction Equation

HEALTH Refer to the data in Example 1.

a. Draw a line of fit for the data. How well does the line fit the data?

Since a single line cannot be drawn that goes through all of the data points, draw a line through the points (0, 73.2) and (28, 1149.1). This line fits the data fairly well, since the line shows the upward trend of the data. Other lines may be chosen that lie closer to the second and third data points.



b. Find a prediction equation. What do the slope and y-intercept indicate?

Find an equation of the line through (0, 73.2) and (28, 1149.1). Begin by finding the slope.

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} && \text{Slope formula} \\ &= \frac{1149.1 - 73.2}{28 - 0} && \text{Substitute.} \\ &= 38.425 && \text{Simplify.} \end{aligned}$$

$$\begin{aligned} y - y_1 &= m(x - x_1) && \text{Point-slope form} \\ y - 73.2 &= 38.425(x - 0) && m = 38.425, (x_1, y_1) = (0, 73.2) \\ y - 73.2 &= 38.425x - 0 && \text{Distributive Property} \\ y &= 38.425x + 73.2 && \text{Add 73.2 to each side.} \end{aligned}$$

One prediction equation is $y = 38.425x + 73.2$. The slope indicates that the amount of money spent on health care is increasing at a rate of about \$38.425 billion per year. The y -intercept indicates that, according to the trend of the rest of the data, the amount of money spent on health care in 1970 was \$73.2 billion.

c. Predict the amount of money spent on health care in 2005.

The year 2005 is 35 years after 1970, so use the prediction equation to find the value of y when $x = 35$.

$$\begin{array}{ll} y = 38.425x + 73.2 & \text{Prediction equation} \\ = 38.425(35) + 73.2 & x = 35 \\ = 1418.075 & \text{Simplify.} \end{array}$$

The model predicts that the amount of money that will be spent in 2005 will be about \$1418 billion or \$1,418,000,000,000.

d. How accurate is the predication?

The line fits the data fairly well, so the predicted value should be fairly accurate. Other predictions would result if a line closer to the middle data points had been chosen.