

Using Linear Models - Linear Regression

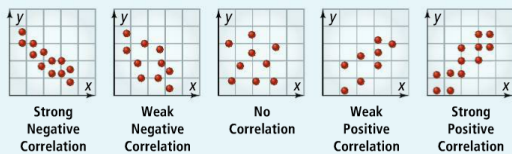
Graphs of data pairs for a real-world situation rarely fall in a line. Their arrangement, however, can suggest a relationship that you can model with a linear function.

**Essential Understanding** Sometimes it is possible to model data from a real-world situation with a linear equation. You can then use the equation to draw conclusions about the situation.

A **scatter plot** is a graph that relates two sets of data by plotting the data as ordered pairs. You can use a scatter plot to determine the strength of the relationship, or **correlation**, between data sets. The closer the data points fall along a line,

- the stronger the relationship and
- the stronger the positive or negative correlation

between the two variables.



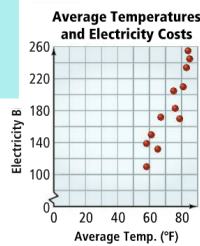
**Utilities** The table lists average monthly temperatures and electricity costs for a Texas home in 2008. The table displays the values rounded to the nearest whole number. Make a scatter plot. How would you describe the correlation?

**Average Temperatures and Electricity Costs**

Month	Average Temp. (°F)	Electricity Bill (\$)	Month	Average Temp. (°F)	Electricity Bill (\$)
January	61	150	July	84	255
February	58	139	August	85	245
March	67	172	September	81	210
April	75	205	October	76	183
May	79	170	November	65	132
June	83	234	December	58	110

**Step 1** Make a scatter plot.

**Step 2** Describe the correlation.



**Problem 3 Finding the Line of Best Fit**

**Food** You research the average cost of whole milk for several recent years to look for trends. The table shows your data.

Cost of Whole Milk						
Year	1998	2000	2002	2004	2006	2008
Average cost for one gallon (\$)	2.65	2.89	3.00	3.01	3.20	3.77

Source: U.S. Department of Agriculture

**A** What is the equation for the line of best fit? How accurate is your line of best fit?

**Step 1**

Use the **STAT** feature to enter the data in your graphing calculator. Enter the x-values (year) in **L1** and the y-values (price) in **L2**. Let 1997 = year 0.

**Step 2**

Use **LinReg** to find the linear regression line of best fit for the data.



**B** Based on your linear model, how much would you expect to pay for a gallon of whole milk in 2020?

Note: Beware of predicting outside of the range of given data. In statistics, this is called extrapolation, and it is not always reliable.