

# Scatter Plots and Association

**Essential question:** *How can you construct and interpret scatter plots?*

A set of **bivariate data** involves two variables. Bivariate data are used to explore the relationship between two variables. You can graph bivariate data on a *scatter plot*. A scatter plot is a graph with points plotted to show the relationship between two sets of data.

COMMON CORE  
CC.8.SP.1

## 1 EXPLORE Making a Scatter Plot

The final question on a math test reads, "How many hours did you spend studying for this test?" The teacher records the number of hours each student studied and the grade the student received on the test.

Hours Spent Studying	Test Grade
0	75
0.5	80
1	80
1	85
1.5	85
1.5	95
2	90
3	100
4	90

- A** Make a prediction about the relationship between the number of hours spent studying and test grades.

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- B** Make a scatter plot. Graph hours spent studying as the independent variable and test grade as the dependent variable.

### REFLECT

- 1a.** What trend do you see in the data?

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- 1b.** Do you think that studying for 10 hours would greatly increase a student's grade?

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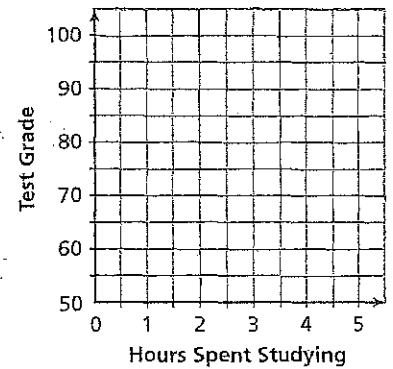
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- 1c.** Why might a student who studied fewer hours make a higher score?

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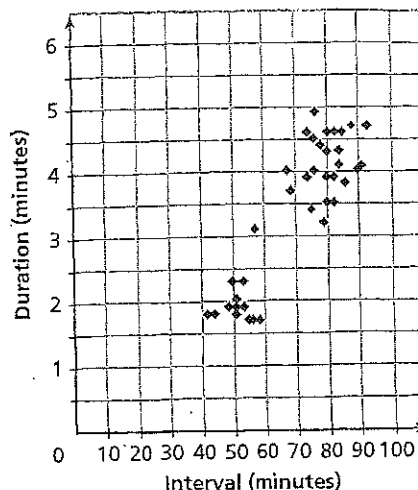
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A cluster is a set of closely grouped data. Data may cluster around a point or along a line. An outlier is a data point that is very different from the rest of the data in the set.

## 2 EXAMPLE Interpreting Clusters and Outliers

A scientist gathers information about the eruptions of Old Faithful, a geyser in Yellowstone National Park. She uses the data to create a scatter plot. The data shows the length of time between eruptions (interval) and how long the eruption lasts (duration).



A Describe any clusters you see in the scatter plot.

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B What do the clusters tell you about eruptions of Old Faithful?

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C Describe any outliers you see in the scatter plot.

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### REFLECT

2a. Suppose the geyser erupts for 2.2 minutes after a 75-minute interval. Would this point lie in one of the clusters? Would it be an outlier? Explain your answer.

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2b. Suppose the geyser erupts after an 80-minute interval. Give a range of possible duration times for which the point on the scatter plot would not be considered an outlier. Give your reasoning.

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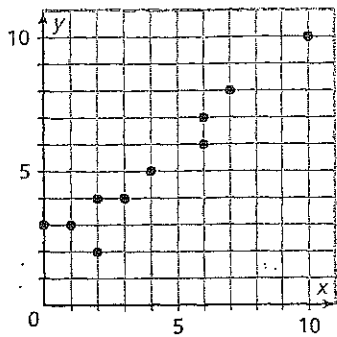


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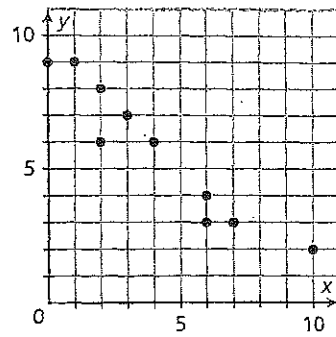


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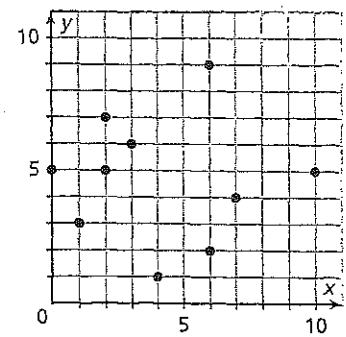
Association tells you how sets of data are related. A positive association means that both data sets increase together. A negative association means that as one data set increases, the other decreases. No association means that changes in one data set do not affect the other data set.



Positive Association



Negative Association



No Association

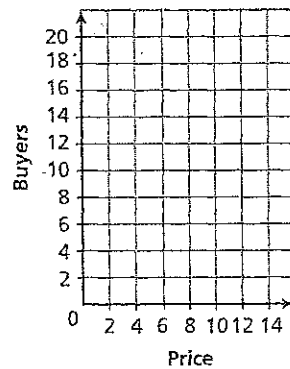
When data shows a positive or negative association and falls along a line, there is a linear association. When data shows a positive or negative relationship, but does not fall along a line, there is a nonlinear association.

### 3 EXPLORE Determining Association

Susan surveyed 20 people about the price of a cleaning product she developed. She asked each person whether they would buy the cleaner at different prices. A person may answer yes or no to more than one price. Susan's results are shown in the table.

Price (\$)	Buyers
2	20
4	19
6	17
8	13
10	8
12	2

- A Make a scatter plot of the data.



- B Describe the type(s) of association you see between price and number of people who would buy at that price. Explain.

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# PRACTICE

Bob recorded his height at different ages.

Age (years)	6	8	10	12	14
Height (inches)	45	50	55	61	63

1. Make a scatter plot of Bob's data.
2. Describe the type(s) of association between Bob's age and his height. Explain.

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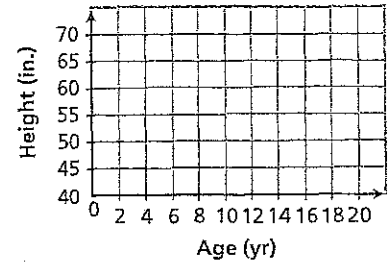
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Ms. Banks recorded the height and reading level of several students.

3. Describe the type(s) of association between a student's height and his or her reading level. Explain.

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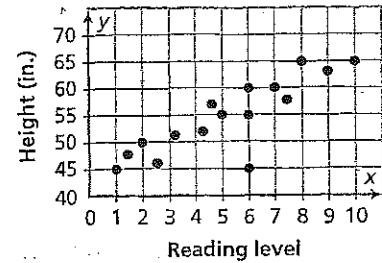
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4. **Error Analysis** Ms. Banks concludes that an increase in reading level causes an increase in height. Explain whether you agree with her conclusion.

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5. Add a point that is an outlier to the graph. Then, explain why it is an outlier.

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