

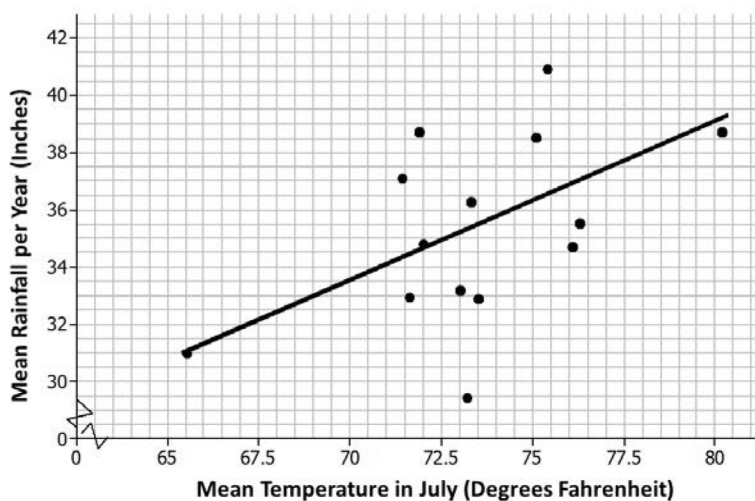
Name _____

Date _____

Informally Fitting a Line

The plot below is a scatter plot of mean temperature in July and mean inches of rain per year for a sample of Midwestern cities. A line is drawn to fit the data.

July Temperatures and Rainfall in Selected Midwestern Cities



Data Source: <http://countrystudies.us/united-states/weather/>

1. Choose a point in the scatter plot and explain what it represents.
2. Use the line provided to predict the mean number of inches of rain per year for a city that has a mean temperature of 70°F in July.
3. Do you think the line provided is a good one for this scatter plot? Explain your answer.

1. The table below shows the mean temperature in July and the mean amount of rainfall per year for 14 cities in the Midwest.

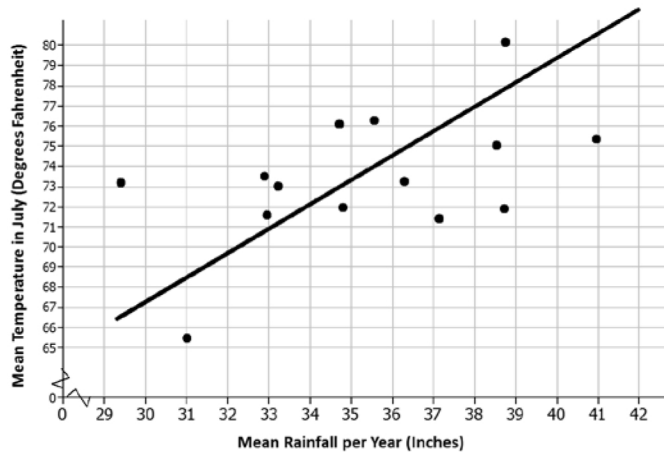
| City | Mean Temperature in July (Degrees Fahrenheit) | Mean Rainfall per Year (inches) |
|--------------------------|--|------------------------------------|
| Chicago, IL | 73.3 | 36.27 |
| Cleveland, OH | 71.9 | 38.71 |
| Columbus, OH | 75.1 | 38.52 |
| Des Moines, IA | 76.1 | 34.72 |
| Detroit, MI | 73.5 | 32.89 |
| Duluth, MN | 65.5 | 31.00 |
| Grand Rapids, MI | 71.4 | 37.13 |
| Indianapolis, IN | 75.4 | 40.95 |
| Marquette, MI | 71.6 | 32.95 |
| Milwaukee, WI | 72.0 | 34.81 |
| Minneapolis–St. Paul, MN | 73.2 | 29.41 |
| Springfield, MO | 76.3 | 35.56 |
| St. Louis, MO | 80.2 | 38.75 |
| Rapid City, SD | 73.0 | 33.21 |

Data Source: <http://countrystudies.us/united-states/weather/>

- a. What do you observe from looking at the data in the table?

- b. Look at the scatter plot below. A line is drawn to fit the data. The plot in the Exit Ticket had the mean July temperatures for the cities on the horizontal axis. How is this plot different, and what does it mean for the way you think about the relationship between the two variables, temperature and rain?

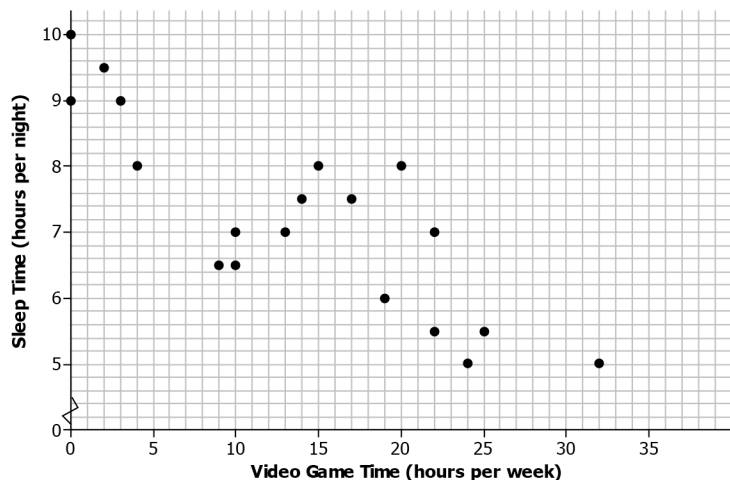
July Rainfall and Temperatures in Selected Midwestern Cities



- c. The line has been drawn to model the relationship between the amount of rain and the temperature in those Midwestern cities. Use the line to predict the mean July temperature for a Midwestern city that has a mean of 32 inches of rain per year.
- d. For which of the cities in the sample will the line do the worst job of predicting the mean temperature? The best? Explain your reasoning with as much detail as possible.

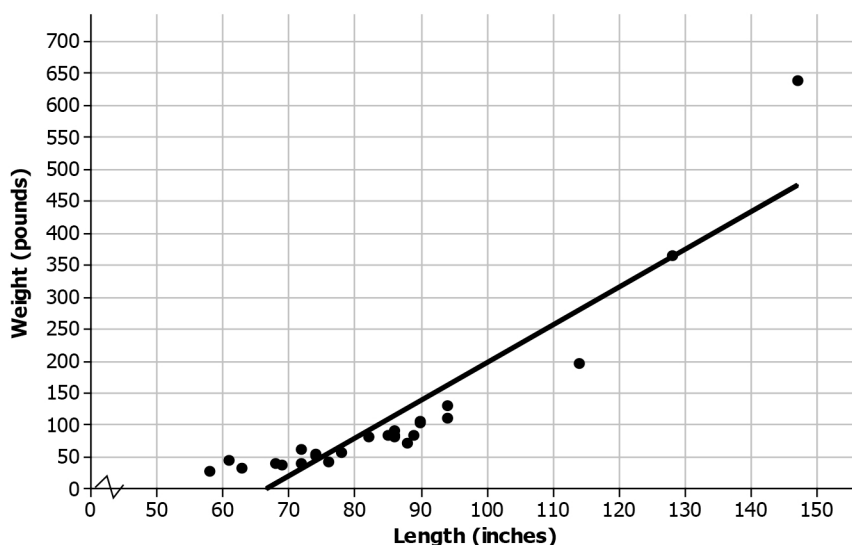
2. The scatter plot below shows the results of a survey of eighth-grade students who were asked to report the number of hours per week they spend playing video games and the typical number of hours they sleep each night.

Mean Hours Sleep per Night vs. Mean Hours Playing Video Games per Week



- a. What trend do you observe in the data?
 - b. What was the fewest number of hours per week that students who were surveyed spent playing video games? The most?
 - c. What was the fewest number of hours per night that students who were surveyed typically slept? The most?
 - d. Draw a line that seems to fit the trend in the data and find its equation. Use the line to predict the number of hours of sleep for a student who spends about 15 hours per week playing video games.
3. Scientists can take very good pictures of alligators from airplanes or helicopters. Scientists in Florida are interested in studying the relationship between the length and the weight of alligators in the waters around Florida.
- a. Would it be easier to collect data on length or weight? Explain your thinking.
 - b. Use your answer to decide which variable you would want to put on the horizontal axis and which variable you might want to predict.
4. Scientists captured a small sample of alligators and measured both their length (in inches) and weight (in pounds). Torre used their data to create the following scatter plot and drew a line to capture the trend in the data. She and Steve then had a discussion about the way the line fit the data. What do you think they were discussing and why?

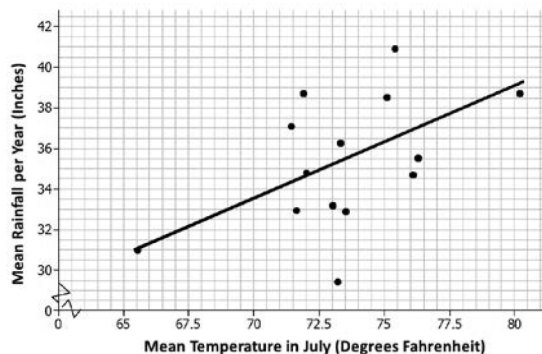
Alligator Length (in.) and Weight (lb.)



Data Source: <http://exploringdata.net/stories.htm#alligatr>

The plot below is a scatter plot of mean temperature in July and mean inches of rain per year for a sample of Midwestern cities.

July Temperatures and Rainfall in Selected Midwestern Cities



Data Source: <http://countrystudies.us/united-states/weather/>

1. Choose a point in the scatter plot and explain what it represents.

Answers will vary. Sample response: The point at about (72, 35) represents a Midwestern city where the mean temperature in July is about 72°F and where the rainfall per year is about 35 inches.

2. Use the line provided to predict the mean number of inches of rain per year for a city that has a mean temperature of 70°F in July.

Predicted rainfall = 33 inches of rain per year. (Some students will state approximately 33.5 inches of rain.)

3. Do you think the line provided is a good one for this scatter plot? Explain your answer.

Yes, the line follows the general pattern in the scatter plot, and it does not look like there is another area in the scatterplot where the points would be any closer to the line.

1. The table below shows the mean temperature in July and the mean amount of rainfall per year for 14 cities in the Midwest.

| City | Mean Temperature in July (Degrees Fahrenheit) | Mean Rainfall per Year (Inches) |
|--------------------------|--|------------------------------------|
| Chicago, IL | 73.3 | 36.27 |
| Cleveland, OH | 71.9 | 38.71 |
| Columbus, OH | 75.1 | 38.52 |
| Des Moines, IA | 76.1 | 34.72 |
| Detroit, MI | 73.5 | 32.89 |
| Duluth, MN | 65.5 | 31.00 |
| Grand Rapids, MI | 71.4 | 37.13 |
| Indianapolis, IN | 75.4 | 40.95 |
| Marquette, MI | 71.6 | 32.95 |
| Milwaukee, WI | 72.0 | 34.81 |
| Minneapolis–St. Paul, MN | 73.2 | 29.41 |
| Springfield, MO | 76.3 | 35.56 |
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| Rapid City, SD | 73.0 | 33.21 |

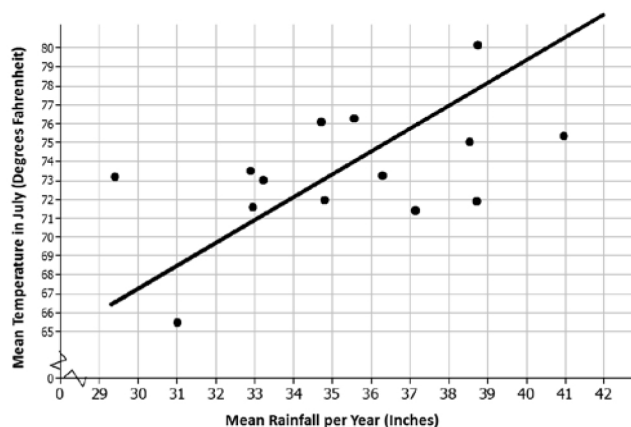
Data Source: <http://countrystudies.us/united-states/weather/>

- a. What do you observe from looking at the data in the table?

Answers will vary. Many of the temperatures were in the 70s, and many of the mean inches of rain were in the 30s. It also appears that, in general, as the rainfall increased, the mean temperature also increased.

- b. Look at the scatter plot below. A line is drawn to fit the data. The plot in the Exit Ticket had the mean July temperatures for the cities on the horizontal axis. How is this plot different, and what does it mean for the way you think about the relationship between the two variables, temperature and rain?

July Rainfall and Temperatures in Selected Midwestern Cities



This scatter plot has the labels on the axes reversed: (mean inches of rain, mean temperature). This is the scatter plot I would use if I wanted to predict the mean temperature in July knowing the mean amount of rain per year.

- c. The line has been drawn to model the relationship between the amount of rain and the temperature in those Midwestern cities. Use the line to predict the mean July temperature for a Midwestern city that has a mean of 32 inches of rain per year.

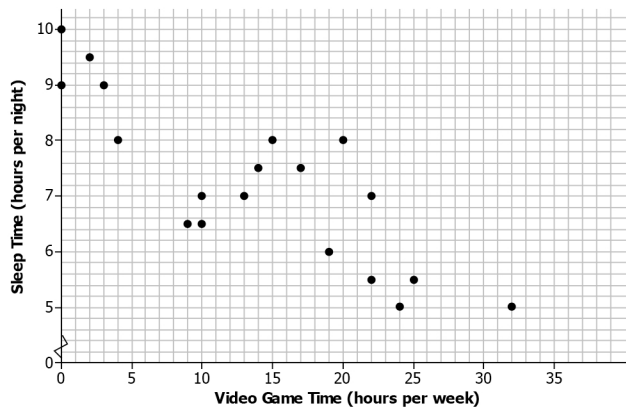
Answers will vary. For 32 in. of rain per year, the line indicates a mean July temperature of approximately 70°F.

- d. For which of the cities in the sample will the line do the worst job of predicting the mean temperature? The best? Explain your reasoning with as much detail as possible.

Answers will vary. I looked for points that were really close to the line and ones that were far away. The line prediction for temperature would be farthest off for Minneapolis. For 29.41 in. of rain in Minneapolis, the line predicted approximately 67°F, whereas the actual mean temperature in July was 73.2°F. The line predicted very well for Milwaukee. For 32.95 in. of rain in Milwaukee, the line predicted approximately 73°F, whereas the actual mean temperature in July was 72°F and was only off by about 1°F. The line was also close for Marquette. For 34.81 in. of rain in Marquette, the line predicted approximately 71°F, whereas the actual mean temperature in July was 71.6°F and was only off by about 1°F.

2. The scatter plot below shows the results of a survey of eighth-grade students who were asked to report the number of hours per week they spend playing video games and the typical number of hours they sleep each night.

Mean Hours Sleep per Night vs. Mean Hours Playing Video Games per Week



- a. What trend do you observe in the data?

The more hours that students play video games, the fewer hours they tend to sleep.

- b. What was the fewest number of hours per week that students who were surveyed spent playing video games? The most?

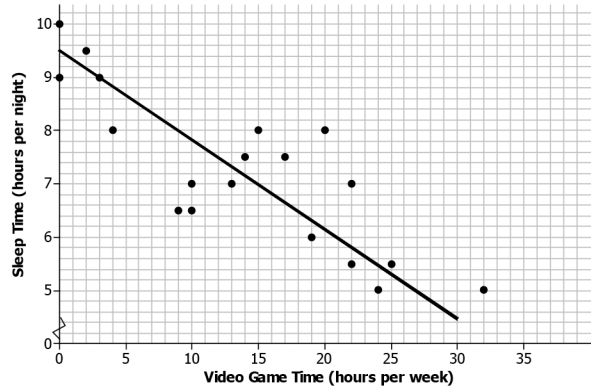
Two students spent 0 hours and one student spent 32 hours per week per week playing games.

- c. What was the fewest number of hours per night that students who were surveyed typically slept? The most?

The fewest hours of sleep per night was around 5 hours and the most was around 10 hours.

- d. Draw a line that seems to fit the trend in the data and find its equation. Use the line to predict the number of hours of sleep for a student who spends about 15 hours per week playing video games.

Answers will vary. A student who spent 15 hours per week playing games would get about 7 hours of sleep per night.



3. Scientists can take very good pictures of alligators from airplanes or helicopters. Scientists in Florida are interested in studying the relationship between the length and the weight of alligators in the waters around Florida.

- a. Would it be easier to collect data on length or weight? Explain your thinking.

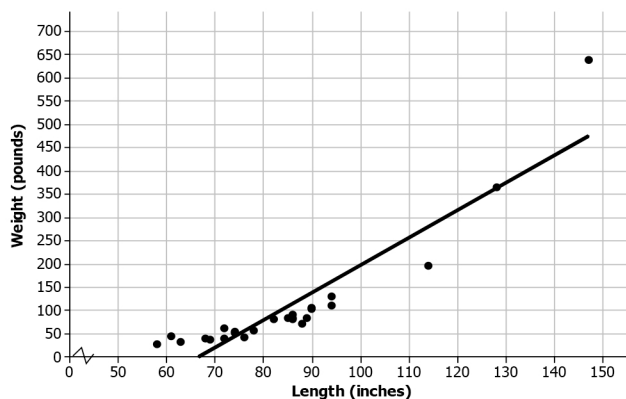
Answers will vary. You could measure the length from the pictures, but you would have to actually have the alligators to weigh them.

- b. Use your answer to decide which variable you would want to put on the horizontal axis and which variable you might want to predict.

You would probably want to predict the weight of the alligator knowing the length; therefore, the length would go on the horizontal axis and the weight on the vertical axis.

4. Scientists captured a small sample of alligators and measured both their length (in inches) and weight (in pounds). Torre used their data to create the following scatter plot and drew a line to capture the trend in the data. She and Steve then had a discussion about the way the line fit the data. What do you think they were discussing and why?

Alligator Length (in.) and Weight (lb.)



Data Source: <http://exploringdata.net/stories.htm#alligatr>

Answers will vary. Sample response: The pattern in the scatter plot is curved instead of linear. All of the data points in the middle of the scatter plot fall below the line, and the line does not really capture the pattern in the scatter plot. A line does not pass through the cluster of points between 60 to 80 in. in length that fit the other points. A model other than a line might be a better fit.