

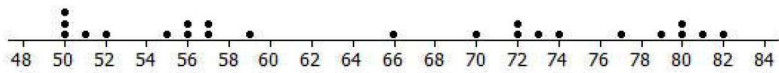
Name \_\_\_\_\_

Date \_\_\_\_\_

# Describing Variability Using the Interquartile Range (IQR)

1. On the graph below, insert the following words in approximately the correct position.

Maximum      Minimum      IQR      Median      Lower Quartile (Q1)      Upper Quartile (Q3)



2. Estimate the IQR based on the data set above.

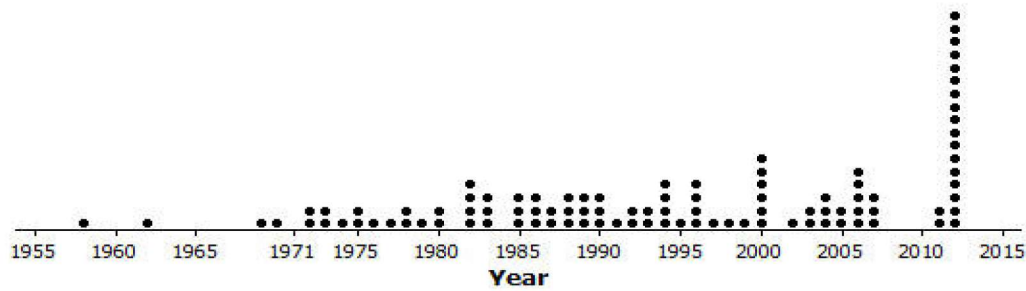
1. The average monthly high temperatures (in °F) for St. Louis and San Francisco are given in the table below.

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
St. Louis	40	45	55	67	77	85	89	88	81	69	56	43
San Francisco	57	60	62	63	64	67	67	68	70	69	63	57

Data Source: [www.weather.com/weather/wxclimatology/monthly/graph/USCA0987](http://www.weather.com/weather/wxclimatology/monthly/graph/USCA0987)  
[www.weather.com/weather/wxclimatology/monthly/graph/USMO0787](http://www.weather.com/weather/wxclimatology/monthly/graph/USMO0787)

- How do you think the data might have been collected?
- Do you think it would be possible for  $\frac{1}{4}$  of the temperatures in the month of July for St. Louis to be 95° or above? Why or why not?
- Make a prediction about how the sizes of the IQR for the temperatures for each city compare. Explain your thinking.
- Find the IQR for the average monthly high temperature for each city. How do the results compare to your conjecture?

2. The plot below shows the years in which each of 100 pennies were made.

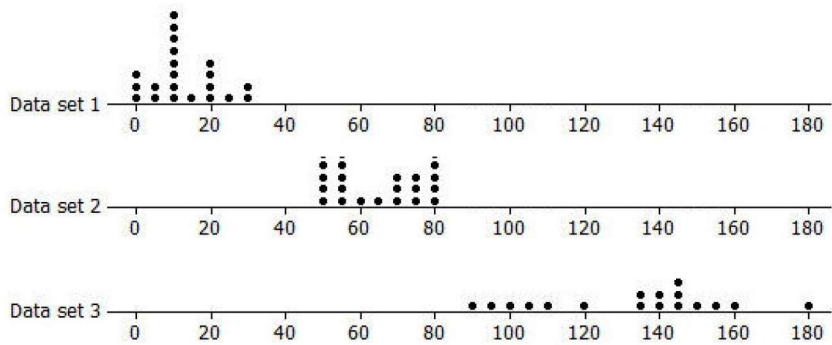


- a. What does the stack of 17 dots at 2012 representing 17 pennies tell you about the “age” of the pennies in 2014?
- b. Here is some information about the sample of pennies. The mean year they were made is 1994; the first year any of the pennies were made was 1958; the newest pennies were made in 2012; Q1 is 1984, the median is 1994, and Q3 is 2006; the MAD is 11.5 years. Use the information to indicate the years in which the middle half of the pennies was made.

3. Create a data set with at least 6 elements such that it has the following:

- a. A small IQR and a big range (maximum-minimum).
- b. An IQR equal to the range.
- c. The lower quartile is the same as the median.

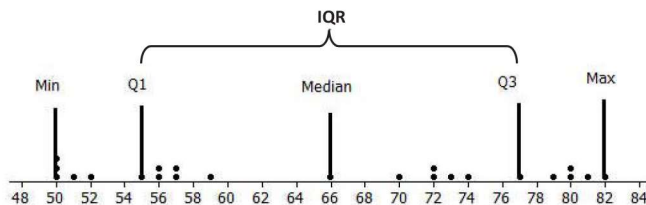
4. Rank the following three data sets by the value of the IQR.



- 5. Here are the counts of the fries in each of the bags from Restaurant A:  
80, 72, 77, 80, 90, 85, 93, 79, 84, 73, 87, 67, 80, 86, 92, 88, 86, 88, 66, and 77.
- a. Suppose one bag of fries had been overlooked in the sample and that bag had only 50 fries. Would the IQR change? Explain your reasoning.
- b. Will adding another data value always change the IQR? Give an example to support your answer.

1. On the graph below, insert the following words in approximately the correct position.

Maximum      Minimum      IQR      Median      Lower Quartile (Q1)      Upper Quartile (Q3)



2. Estimate the IQR based on the data set above.

*The IQR is approximately 22.*

1. The average monthly high temperatures (in °F) for St. Louis and San Francisco are given in the table below.

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
St. Louis	40	45	55	67	77	85	89	88	81	69	56	43
San Francisco	57	60	62	63	64	67	67	68	70	69	63	57

Data Source: [www.weather.com/weather/wxclimatology/monthly/graph/USCA0987](http://www.weather.com/weather/wxclimatology/monthly/graph/USCA0987)  
[www.weather.com/weather/wxclimatology/monthly/graph/USMO0787](http://www.weather.com/weather/wxclimatology/monthly/graph/USMO0787)

- a. How do you think the data might have been collected?

*Someone at a park or the airport or someplace probably records the temperature every hour of every day and then takes all of the highest ones and finds the mean.*

- b. Do you think it would be possible for  $\frac{1}{4}$  of the temperatures in the month of July for St. Louis to be 95° or above? Why or why not?

*Yes, it is possible. The mean temperature in St. Louis for July is 89°. There are 31 days in July, so  $\frac{1}{4}$  of the days would be about 8 days. If the temperature was 95° for 5 days, 100° for 3 days, and 87° for all of the rest of the days, it would work.*

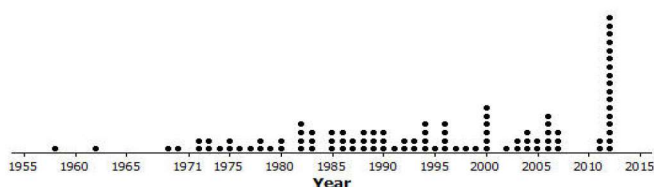
- c. Make a prediction about how the sizes of the IQR for the temperatures for each city compare. Explain your thinking.

*San Francisco probably has the smaller IQR because those temperatures don't seem to vary as much as the St. Louis temperatures.*

- d. Find the IQR for the average monthly high temperature for each city. How do the results compare to your conjecture?

*For San Francisco the IQR is 6.5°; St. Louis is 33°.*

2. The plot below shows the years in which each of 100 pennies were made.



- a. What does the stack of 17 dots at 2012 representing 17 pennies tell you about the “age” of the pennies in 2014?
- 17 pennies were made in 2012, and they would be 2 years old in 2014.*
- b. Here is some information about the sample of pennies. The mean year they were made is 1994; the first year any of the pennies were made was 1958; the newest pennies were made in 2012; Q1 is 1984, the median is 1994, and Q3 is 2006; the MAD is 11.5 years. Use the information to indicate the years in which the middle half of the pennies was made.

*In this case, the IQR is 22 years and the mean  $\pm$  the MAD gives an interval of 23, so the middle half of the pennies were made over an interval of 22 years.*

3. Create a data set with at least 6 elements such that it has the following:

- a. A small IQR and a big range (maximum-minimum).

*Answers will vary: {0, 100, 50, 50, 50, 50, 50} where the range is 100 and the IQR is 0.*

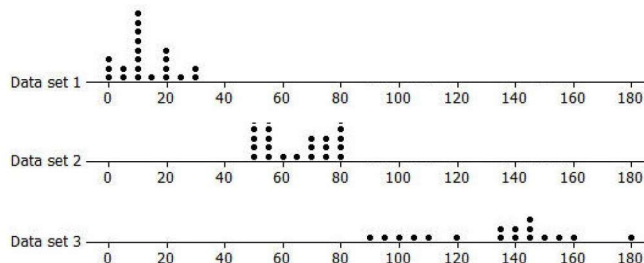
- b. An IQR equal to the range.

*Answers will vary: {10, 10, 10, 15, 20, 20, 20}*

- c. The lower quartile is the same as the median.

*Answers will vary: {1, 1, 1, 1, 1, 5, 6, 7}*

4. Rank the following three data sets by the value of the IQR.



*Data set 1 has the smallest IQR at about 14, data set 2 the next smallest at about 22, and data set 3 the largest at about 41. (Be sure students do not confuse data set with the larger quartiles as having the larger IQR.)*

5. Here are the counts of the fries in each of the bags from Restaurant A:

80, 72, 77, 80, 90, 85, 93, 79, 84, 73, 87, 67, 80, 86, 92, 88, 86, 88, 66, and 77.

- a. Suppose one bag of fries had been overlooked in the sample and that bag had only 50 fries. Would the IQR change? Explain your reasoning.

*The IQR would be larger, 12.5, because the median number of fries would be at 80 now instead of 82, which would make the lower quartile at 75 instead of 77.*

- b. Will adding another data value always change the IQR? Give an example to support your answer.

*No, it depends on how many values you have in the data set. For example, if the set of data is {2, 2, 2, 6, 9, 9, 9}, the IQR is  $9 - 2 = 7$ . If you add another 6, the IQR would stay at 7.*