COMPARATIVE DOT PLOTS

The student is expected to compare two groups of numeric data using comparative dot plots or box plots by comparing their shapes, centers, and spreads.

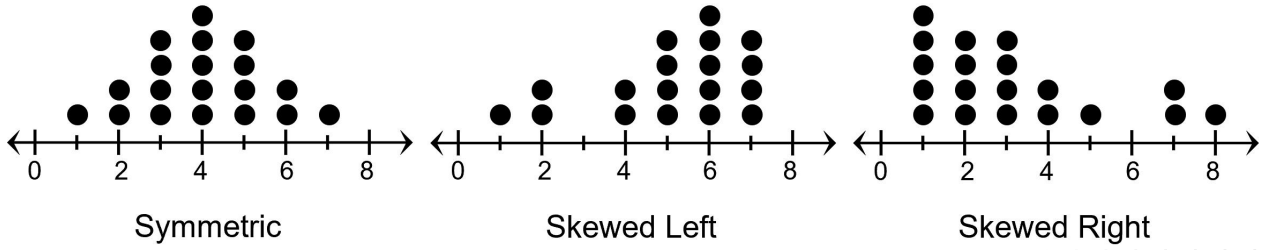
TELL ME MORE...

A **dot plot** uses a number line to show how frequently numerical data appears.

There are characteristics of a data set that can help you to better understand what the data in the set mean: shape, center and spread. The **shape** of a data set is described by the symmetry or skew of the graph. The **center** of a data set is a way to describe a typical value in the data set. The **spread** of a data set is how spread out the data values are in the set.

Shape

A graph is **symmetric** if the left and right side of the graph are mirror images of each other. A graph is **skewed** if it has more data on one side rather than the other. A graph that has a cluster of data and then several points to the left of the cluster is **skewed left**. A graph that has a cluster of data and then several points to the right of the cluster is **skewed right**.



Center

There are two numbers you can use to identify the center of a data set. The **mean** is the average value in the data set. The **median** is the data value that, when listed in order from least to greatest, is the middle value in the data set.

The **mode**, the number that appears the most often, also describes the central tendency of a data set.

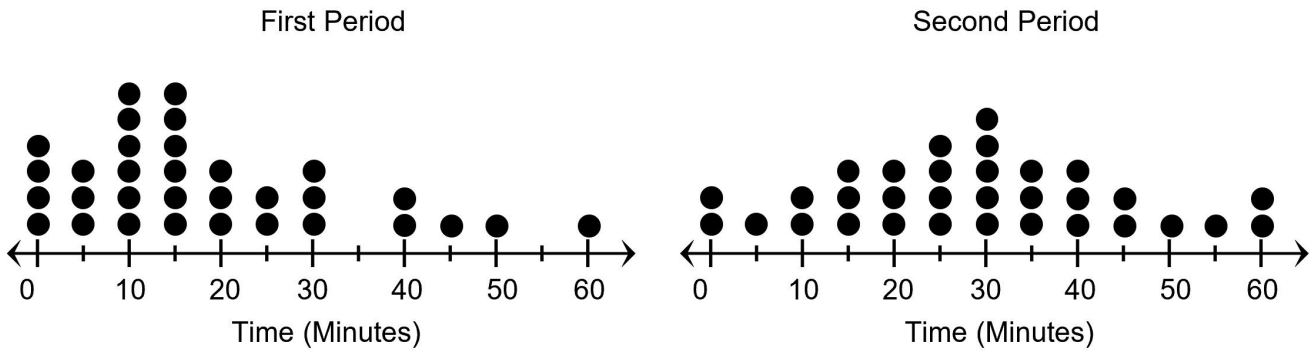
Spread

You can use the range to describe the spread of a data set. The **range** is the difference between the maximum value and minimum value for a data set.

If you have two different data sets that are represented in dot plots, you can use the two dot plots to compare the shape, center, and spread of the two data sets.

EXAMPLES

EXAMPLE 1: Mrs. Andrews surveyed the students in her math classes to find out how many minutes each one studied for the last test. She created a dot plot for 1st period and for 2nd period.



Which of the following statements are supported by the data in the two dot plots?

I. The least number of minutes students studied in Mrs. Andrews' 1st period is greater than the least number of minutes students studied in Mrs. Andrews' 2nd period.

II. The data for Mrs. Andrews' 2nd period is more symmetrical than the data for Mrs. Andrews' 1st period.

III. The mode number of minutes students studied in Mrs. Andrews' 1st period is less than the mode number of minutes students studied in Mrs. Andrews' 2nd period.

IV. The range of the data for Mrs. Andrews' 1st period is less than the range of the data for Mrs. Andrews' 2nd period.

V. The median number of the data for Mrs. Andrews' 2nd period is greater than the median number of the data for Mrs. Andrews' 1st period.

VI. The data for Mrs. Andrews' 1st period is skewed more to the right than the data for Mrs. Andrews' 2nd period.

STEP 1 Evaluate Statement I. Determine which measure is described and interpret the dot plot to determine whether or not the statement is true.

- In a dot plot, the least value, or minimum value, is represented by the dot that is farthest left on the number line.
- For 1st period, the minimum value is 0 and for 2nd period, the minimum value is 0.
- 0 is not greater than 0.

Statement I is false.

STEP 2 Evaluate Statement II. Examine each graph to determine its symmetry or skew.

- Symmetric data sets have two halves that look like mirror images.
- The data for 1st period appear to be skewed right since there is a cluster of data values on the left and a few data values to the right of the cluster.
- The data for 2nd period appear to peak in the middle, at 30 minutes, and then evenly decrease to the right and left of 30 minutes.
- The data for 2nd period appears to be symmetrical.

Statement II is true.

STEP 3 Evaluate Statement III. Determine which measure is described and interpret the dot plot to determine whether or not the statement is true.

- In a dot plot, the mode is represented by the tallest stack of dots.
- For 1st period, the mode is 10 and 15 and for 2nd period, the mode is 30.
- $10 < 30$ and $15 < 30$

Statement III is true.

STEP 4 Evaluate Statement IV. Determine which measure is described and interpret the dot plot to determine whether or not the statement is true.

- In a dot plot, range is the difference between the values represented by the farthest left and farthest right dots.
- For 1st period, the range is $60 - 0 = 60$ and for 2nd period, the range is $60 - 0 = 60$.
- 60 is not less than 60.

Statement IV is false.

STEP 5 Evaluate Statement V. Determine which measure is described and interpret the dot plot to determine whether or not the statement is true.

- In a dot plot, the median is the number containing the middle dot of the set.
- For 1st period, there are 32 dots and the 16th and 17th dots are both 15, so the median is 15.
- For 2nd period, there are 32 dots and the 16th and 17th dots are both 30, so the median is 30.
- $30 > 15$

Statement V is true.

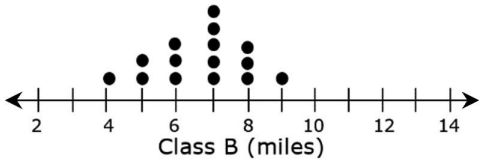
STEP 6 Evaluate Statement VI. Examine each graph to determine its symmetry or skew.

- The data for 1st period appear to be skewed right since there is a cluster of data values on the left and a few data values to the right of the cluster.
- The data for 2nd period appear to be symmetrical since the data values peak in the middle, at 30 minutes, and then evenly decrease to the right and left of 30 minutes.

Statement VI is true.

YOU TRY IT!

The dot plots show the number of miles run per week for two different classes.



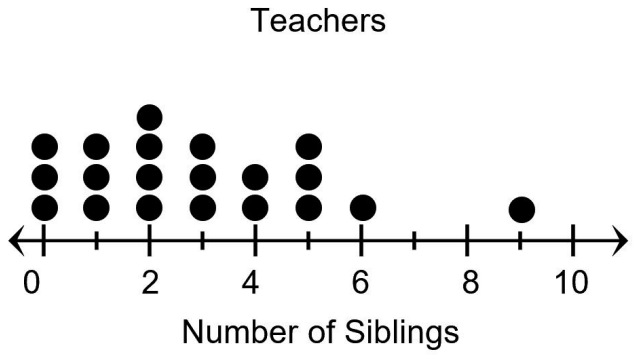
Based on the data in the dot plots, write the following:

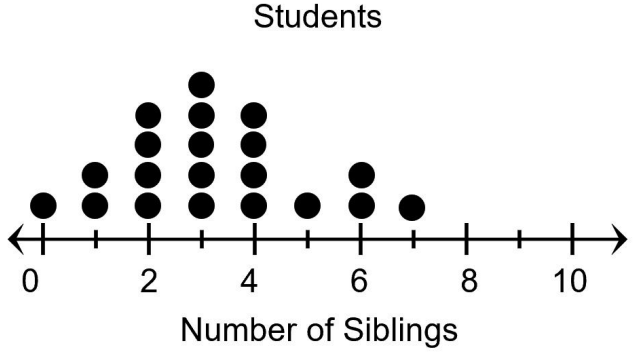
- A true statement comparing the ranges of the data in the dot plots.
- A true statement comparing the medians of the data in the dot plots.
- A false statement comparing the modes of the data in the dot plots.

PRACTICE

Use the following information for questions 1 – 5.

Martha conducted a random survey during lunch. She asked 20 students and 20 teachers how many siblings they have. The survey data are represented in the dot plots below.





Based on the data in the dot plots, fill in the blanks to create a true statement.

1. The range of the data for the survey results for teachers is _____ than the range of the data for the survey results for the students.

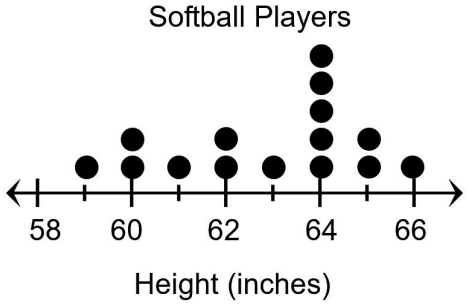
2. The mode of the data for the survey results for teachers is _____ than the mode of the data for the survey results for the students.

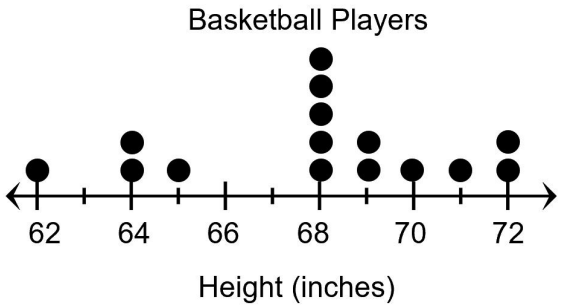
3. The data for the survey for _____ is more symmetrical than the data for the survey for _____.

4. The median of the data for the survey results for teachers is _____ than the median of the data for the survey results for the students.

5. The greatest number of siblings for teachers is _____ than the greatest number of siblings for students.

Use the following information for questions 6 – 7. Determine if each statement is true or false.

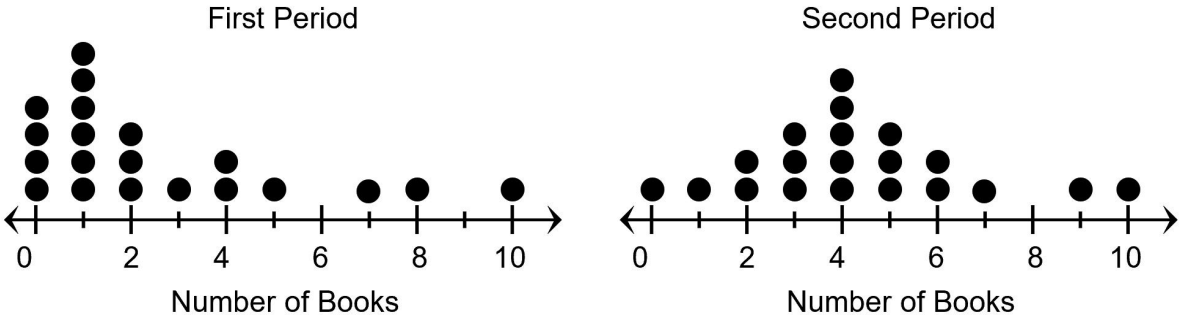




6. The range of the data for the heights of softball players is less than the range of the data for the heights of basketball players.

7. The median of the data for the heights of softball players is greater than the median of the data for the heights of basketball players.

8. Mrs. Khan took a survey in her first and second period classes concerning the number of books that students read last summer.



Which statement is supported by the information in the dot plots?

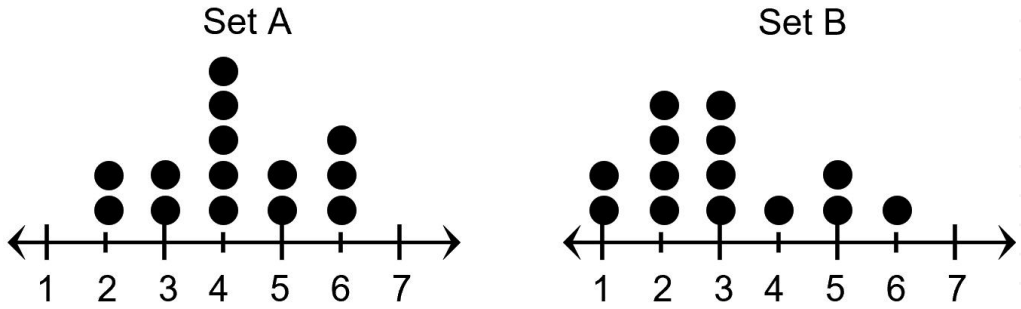
A The data for 1st period and the data for 2nd period are skewed to the right?

B The median number of books read last summer in 1st period is greater than the median number of books read last summer in 2nd period.

C The range of the number of books read last summer in 1st period is equal to the range of the number of books read last summer in 2nd period.

D The mode number of books read last summer in 2nd period is less than the mode number of books read last summer in 1st period.

9. The dot plots below represent two sets of data.



Here are three statements about the data.

I. The mode of the data in Set A is equal to the mode of the data in Set B.

II. The range of the data in Set A is less than the range of the data in Set B.

III. The median of the data in Set A is greater than the median of the data in Set B.

Which of these three statements appear to be true?

F I only

G I and II

H II and III

J III only