

Statistical Studies: Analyzing Data

III.B Student Activity Sheet 6: Analyzing Graphical Displays

The Phoenix Mercury of the Women’s National Basketball League had 14 players on the roster for the 2008 season. The players and their average points per game (PPG) are shown below.

Player	Diana Taurasi	Cappie Poindexter	Tangela Smith	Le’coe Willingham	Kelly Miller	Kelly Mazzante	LaToya Pringle
PPG	24.1	21.2	11.1	10.1	8.3	5.8	4.4

Player	Brooke Smith	Barbara Farris	Olympia Scott	Yuko Oga	Allie Quigley	Willnett Crockett	Jennifer Derevjanik
PPG	4.1	3.5	2.7	2.4	2.1	1.8	0.8

(Source: www.wnba.com/mercury/stats)

1. The smallest value listed in a data set is called the **minimum**. The minimum of this data set is _____. Which player has the minimum value?
2. The largest value listed in a data set is called the **maximum**. The maximum of this data set is _____. Which player has the maximum value?
3. The middle value in a data set is called the **median**. The median of this data set is _____. Which player has the median value? (**Note:** This problem requires some work because a middle value does not exist when there is an even number of data points. In this case, you must average together the two middle values.)
4. Now list the data set horizontally from smallest to largest, and write the median in the list in the appropriate location. Circle the minimum, median, and maximum.
5. Cover up the right side of the list in Question 4 so that you can only see the seven values below your median. Find the median of these seven numbers and circle it; under that number write **Q1**. Repeat this process with the other half of the data by covering up the left side so that you can only see the seven highest values. Find the median of these seven numbers and circle it; under that number write **Q3**.

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The numbers you have circled are called the **five-number summary**. These numbers separate your data into four quartiles, or 25% sections.

- The data between the minimum and Q1 are the first quartile.
 - The data between Q1 and the median are the second quartile.
 - The data between the median and Q3 are the third quartile.
 - The data between Q3 and the maximum are the fourth quartile.
6. The five-number summary allows you to make a graphical display called a **boxplot**, or a **box-and-whisker plot**. The reason for this interesting name becomes obvious as you construct the graph. First you need to decide on a scale. What would be a good scale for these data—to count by 1s, 10s, 100s, or something in between?
7. Construct a box-and-whisker plot. The following steps are provided for your reference.
- Plot your scale on the line below.
 - Place an appropriate label below the line.
 - Place dots for your five-number summary values about an inch above the line.
 - Put a small vertical line, about the size of this *l*, on each dot.
 - Use these lines to construct a box-and-whiskers like this one:



-
8. Interpret the “box” part of your box-and-whisker plot:

50% of the Phoenix Mercury players _____.

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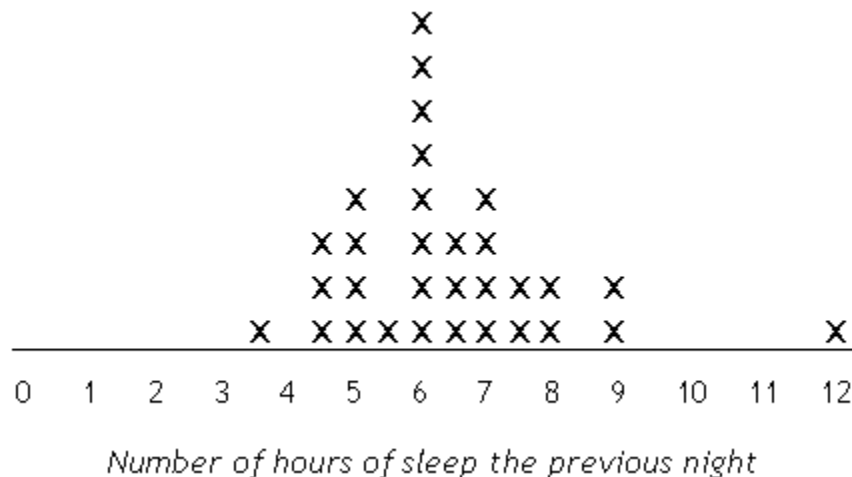
9. You can also create boxplots on your graphing calculator. Sketch your new graph—compare and contrast it to your hand-drawn boxplot.

There may also be an option on your calculator for creating a modified box plot, which reveals any outliers. If so, sketch this graph. What do you think this graph is showing that is different from your previous one? (If you have access to this information using technology, research information about this plot that distinguishes it from a box-and-whisker plot.)

10. **EXTENSION:** After you finish the hand-constructed and calculator graphs, look up statistics for another WNBA team (or NBA team), compute the five-number summary, and add it to the same graph from earlier teams. Thus, you have created a side-by-side boxplot. Compare and contrast the two boxplots.

Take a look at other graphical displays. Consider the characteristics of the center, shape, spread, and any unusual features.

11. The school newspaper conducted a survey in which 31 randomly selected students were asked a variety of questions. The responses to one question are shown in the following dotplot (lineplot). Discuss what you now know about these students.



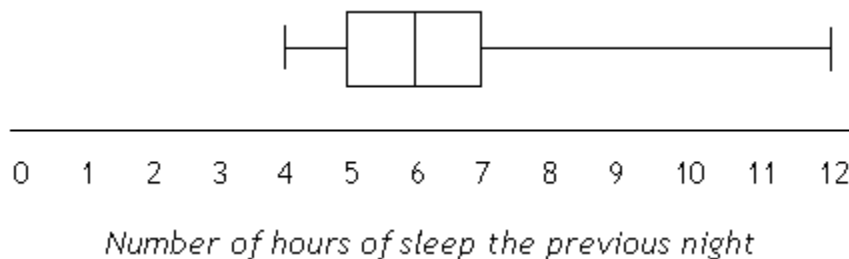
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12. Some members of the newspaper staff wanted to report the sleep data in a frequency table as shown below. Discuss the advantages and disadvantages of this option.

Number of hours of sleep	Frequency
4	1
5	7
6	9
7	7
8	4
9	2
12	1

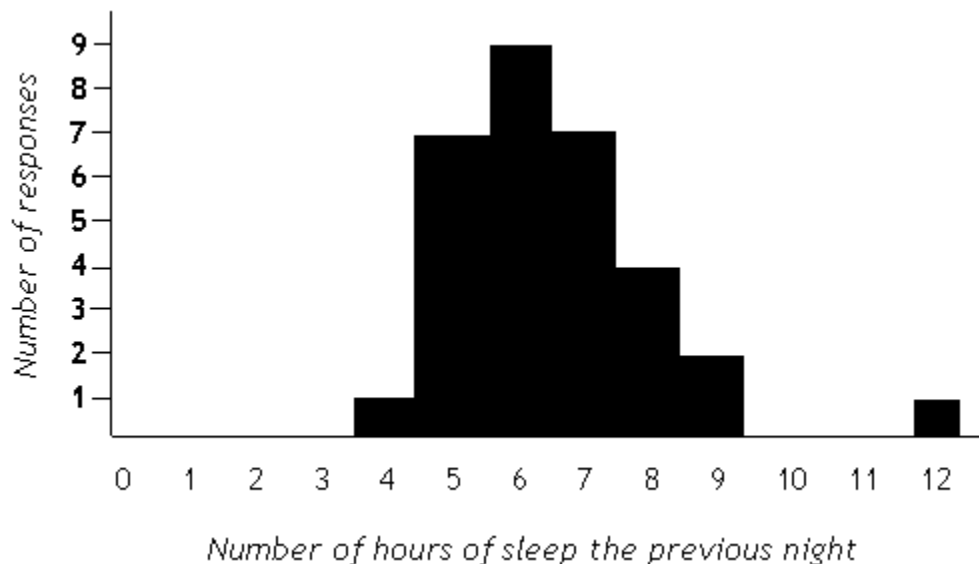
13. Other staff members voted for a boxplot. Compare and contrast the usefulness of this boxplot with that of the previous two graphical displays.



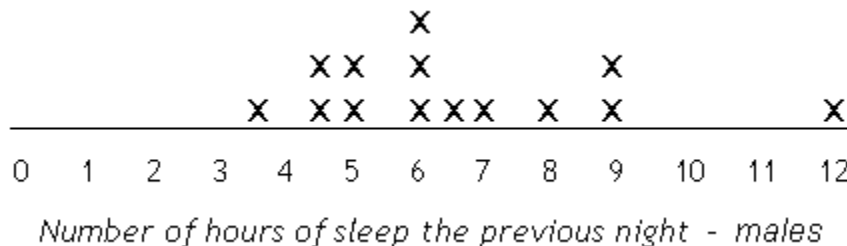
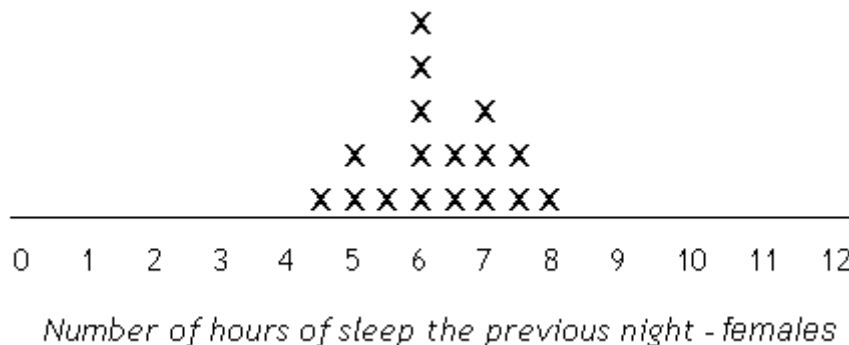
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14. Another group of staffers argued for the following graph. What were their reasons for preferring a histogram? What are the arguments against using one?



15. The following dotplots show the effect of separating the data on male students' hours of sleep from the data on female students' hours of sleep. Compare and contrast the two plots.



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16. Choose the frequency table, boxplot, or histogram format to report the male and female sleep data.
17. **REFLECTION:** Is it easier to compare and contrast the male and female sleep data from the dotplot or from your new display in Question 16? Explain. Refer to the information regarding limitations and differences of various graphical representations to support your thinking as needed.
18. **EXTENSION:** For one of the sets of data in Question 3 in Student Activity Sheet 5, represent the data in as many different graphical displays as possible.
19. **EXTENSION:** Write two reports—an informative paper on student sleep patterns (or other sets of data of their choice) and a persuasive paper that utilizes the data and graph.