Lesson 21: Summarizing a Data Distribution by Describing Center, Variability, and Shape

Each of the lessons in this module is about data. What are data? What questions can be answered by data? How do you represent the data distribution so that you can understand and describe its shape? What does the shape tell us about how to summarize the data? What is a typical value of the data set? These questions, and many others, were part of your work in the exercises and investigations. There is still a lot to learn about what data tell us. You will continue to work with statistics and probability in grades seven and eight and throughout high school. You have already, however, started to learn how to uncover the stories behind data.

When you started this module, the four steps used to carry out a statistical study were introduced:

Step 1: Pose a question that can be answered by data.

Step 2: Collect appropriate data.

Step 3: Summarize the data with graphs and numerical summaries.

Step 4: Answer the question posed in Step 1 using the numerical summaries and graphs.

In this lesson, you will carry out these steps using a given data set.

Classwork

Exploratory Challenge: Annual Rainfall in the State of New York

The National Climate Data Center collects data throughout the United States that can be used to summarize the climate of a region. You can obtain climate data for a state, a city, a county, or a region. If you were interested in researching the climate in your area, what data would you collect? Explain why you think this data would be important as a statistical study of the climate in your area.

For this lesson, you will use yearly rainfall data for the state of New York that were compiled by the National Climate Data Center. The following data are the number of inches of rain (averaged over various locations in the state) for the years from 1983 to 2012 (30 years).

45	42	39	44	39	35	42	49	37	42	41	42	37	50	39
41	38	46	34	44	48	50	47	49	44	49	43	44	54	40

Use the four steps to carry out a statistical study using this data.

Step 1: Pose a question that can be answered by data.

What is a statistical question that you think can be answered with these data? Write your question in the template provided for this lesson.

Step 2:   Collect appropriate data.

The data have already been collected for this lesson. How do you think these data were collected? Recall that the data are the number of inches of rain (averaged over various locations in the state) for the years from 1983 to 2012 (30 years). Write a summary of how you think the data were collected in the template for this lesson.

Step 3:   Summarize the data with graphs and numerical summaries.

A good first step might be to summarize the data with a dot plot. What other graph might you construct? Construct a dot plot or another appropriate graph in the template for this lesson.

What numerical summaries will you calculate? What measure of center will you use to describe a typical value for these data? What measure of variability will you calculate and use to summarize the spread of the data? Calculate the numerical summaries and write them in the template for this lesson.

Step 4:   Answer your statistical question using the numerical summaries and graphs.

Write a summary that answers the question you posed in the template for this lesson

Template for Lesson 21

Step 1: What is your statistical question?

Step 2: How do you think the data were collected?

Step 3: Construct graphs and calculate numerical summaries of the data.

Construct at least one graph of the data distribution. Calculate appropriate numerical summaries of the data. Also indicate why you selected these summaries.

Step 4: Answer your statistical question using your graphs and numerical summaries.

Lesson Summary

Statistics is about using data to answer questions. The four steps used to carry out a statistical study include posing a question that can be answered by data, collecting appropriate data, summarizing the data with graphs and numerical summaries, and using the data, graphs, and summaries to answer the statistical question.

Problem Set

In Lesson 17, you posed a statistical question and a plan to collect data to answer your question. You also constructed graphs and calculated numerical summaries of your data. Review the data collected and your summaries.

Based on directions from your teacher, create a poster or an outline for a presentation using your own data. On your poster, indicate your statistical question. Also, indicate a brief summary of how you collected your data based on the plan you proposed in Lesson 17. Include a graph that shows the shape of your data distribution, along with summary measures of center and variability. Finally, answer your statistical question based on the graphs and the numerical summaries.

Share the poster you will present in Lesson 22 with your teacher. If you are instructed to prepare an outline of the presentation, share your outline with your teacher.