



## Unit Plan

### 6.8 Data Sets and Distributions

Gateway Regional Middle School / Grade 6 / Mathematics

[Week 29 - Week 32](#) | 6 Curriculum Developers | Last Updated: Apr 8, 2024 by LeBlanc, Deanna[Style Guide](#)

## What is the purpose of the unit? What are the major take-aways?

### Standards

#### MA: Mathematics (2017)

#### MA: Grade 6

#### Mathematical Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 7. Look for and make use of structure. [Show Details](#)
- 8. Look for and express regularity in repeated reasoning. [Show Details](#)
- 5. Use appropriate tools strategically. [Show Details](#)
- 6. Attend to precision. [Show Details](#)
- 2. Reason abstractly and quantitatively. [Show Details](#)
- 3. Construct viable arguments and critique the reasoning of others. [Show Details](#)

#### The Number System

6.NS Compute fluently with multi-digit numbers and find common factors and multiples.

- 3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

#### Statistics & Probability

6.SP Develop understanding of statistical variability.

- 1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. [Show Details](#)
- 2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center (median, mean, and/or mode), spread (range interquartile range), and overall shape.
- 3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.

6.SP Summarize and describe distributions.

- 5c. Giving quantitative measures of center (median and/or mean) and variability (range and/or interquartile range), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
- 5d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
- 5. Summarize numerical data sets in relation to their context, such as by:
  - 4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
  - 5a. Reporting the number of observations.
  - 5b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
  - 4.a. Read and interpret circle graphs.

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## Enduring Understandings

Enduring Understandings for the unit "6.8 Data Sets and Distributions":

- Data sets provide insight into patterns, trends, and predictions when analyzed with structure and purpose.
- Strategic use of mathematical tools enhances the accuracy and efficiency of analyzing data sets and distributions.
- Precision in data collection, calculation, and interpretation is crucial for drawing reliable conclusions from data sets.
- Abstract and quantitative reasoning enables the understanding of data sets beyond numerical values, revealing real-world implications.
- Constructing arguments based on data analysis and critiquing others' reasoning are essential for validating findings and understanding multiple perspectives on data interpretations.

## Essential Questions

- How can we organize and display data to make it easier to understand and interpret?
- What do measures of central tendency (mean, median, mode) tell us about a data set?
- How can we use range, interquartile range, and mean absolute deviation to describe the spread of a data set?
- Why is it important to consider both the central tendency and variability when analyzing a data set?
- How can the shape of a data distribution (such as symmetry, skewness, and clusters) influence our interpretation of the data?
- How can graphs and charts help us visualize data distributions and compare different data sets?
- What are the advantages and limitations of different types of graphs (e.g., histograms, box plots) for representing data distributions?
- How can outliers impact the analysis of data, and how should they be handled?

## Content

In this unit, students learn about populations and study variables associated with a population. They understand and use the terms "numerical data," "categorical data," "survey" (as noun and verb), "statistical question," "variability," "distribution," and "frequency." They make and interpret histograms, bar graphs, tables of frequencies, and box plots. They describe distributions (shown on graphical displays) using terms such as "symmetrical," "peaks," "gaps," and "clusters." They work with measures of center—understanding and using the terms "mean," "average," and "median." They work with measures of variability—understanding and using the terms "range," "mean absolute deviation" or MAD, "quartile," and "interquartile range" or IQR. They interpret measurements of center and variability in contexts.

## Skills

### Student-facing learning targets

- I can collect the correct data to answer a question and use the correct units. (Lesson 1)
- I can explain the difference between categorical and numerical data. (Lesson 1)
- I can tell when data has variability. (Lesson 2)
- I can describe the information presented in tables, dot plots, and bar graphs. (Lesson 3)
- I can use tables, dot plots, and bar graphs to represent distributions of data. (Lesson 3)
- I can describe the center and spread of data from a dot plot. (Lesson 4)
- I can use a dot plot to represent the distribution of a data set and answer questions about the real-world situation. (Lesson 5)
- I can use center and spread to describe data sets, including what is typical in a data set. (Lesson 5)
- I can recognize when a histogram is an appropriate graphical display of a data set. (Lesson 6)
- I can use a histogram to get information about the distribution of data and explain what it means in a real-world situation. (Lesson 6)
- I can draw a histogram from a table of data. (Lesson 7)
- I can use a histogram to describe the distribution of data and determine a typical value for the data. (Lesson 7)
- I can describe the shape and features of a histogram and explain what they mean in the context of the data. (Lesson 8)
- I can distinguish histograms and bar graphs. (Lesson 8)
- I can explain how the mean for a data set represents a “fair share.” (Lesson 9)
- I can find the mean for a numerical data set. (Lesson 9)
- I can describe what the mean tells us in the context of the data. (Lesson 10)
- I can explain how the mean represents a balance point for the data on a dot plot. (Lesson 10)
- I can find the MAD for a set of data. (Lesson 11)
- I know what the mean absolute deviation (MAD) measures and what information it provides. (Lesson 11)
- I can say what the MAD tells us in a given context. (Lesson 12)
- I can use means and MADs to compare groups. (Lesson 12)
- I can find the median for a set of data. (Lesson 13)
- I can say what the median represents and what it tells us in a given context. (Lesson 13)
- I can determine when the mean or the median is more appropriate to describe the center of data. (Lesson 14)
- I can explain how the distribution of data affects the mean and the median. (Lesson 14)
- I can use IQR to describe the spread of data. (Lesson 15)
- I know what quartiles and interquartile range (IQR) measure and what they tell us about the data. (Lesson 15)
- When given a list of data values or a dot plot, I can find the quartiles and interquartile range (IQR) for data. (Lesson 15)
- I can use the five-number summary to draw a box plot. (Lesson 16)
- I know what information a box plot shows and how it is constructed. (Lesson 16)
- I can use a box plot to answer questions about a data set. (Lesson 17)
- I can use medians and IQRs to compare groups. (Lesson 17)
- I can decide whether mean and MAD or median and IQR would be more appropriate for describing the center and spread of a data set. (Lesson 18)

- I can draw an appropriate graphical representation for a set of data. (Lesson 18)
- I can explain what the mean and MAD or the median and IQR tell us in the context of a situation and use them to answer questions. (Lesson 18)

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## How will you gauge student learning?

### Assessments

6.8 End-of-Unit Assessment | Summative | Written Test

[9 State Standards Assessed](#)

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## How will students learn?

### Learning Activities

<p><b>Data, Variability, and Statistical Questions</b></p>	<p><b>Lesson 1</b></p> <ul style="list-style-type: none"> <li>• Ask survey questions (orally) and record responses (in writing). Include units of measurement when reporting numerical data (orally and in writing).</li> <li>• Comprehend and use the terms “numerical” and “categorical” to describe data sets (orally and in writing).</li> <li>• Interpret various representations of data sets and determine whether it is reasonable that a verbal description represents a given numerical data set.</li> </ul> <p><b>Lesson 2</b></p> <ul style="list-style-type: none"> <li>• Justify (orally) whether a question is “statistical” based on whether variability is expected in the data that could be collected.</li> <li>• Match survey questions to data sets representing possible responses and justify (in writing) why they match.</li> </ul>
<p><b>Dot Plots and Histograms</b></p>	<p><b>Lesson 3</b></p> <ul style="list-style-type: none"> <li>• Comprehend the word “frequency” to refer to the number of times a particular value occurs in a data set.</li> <li>• Create and interpret a dot plot to answer statistical questions about a numerical data set.</li> <li>• Justify (in writing) whether a dot plot is an appropriate way to display a given data set, paying attention to whether the data set is numerical or categorical.</li> </ul> <p><b>Lesson 4</b></p> <ul style="list-style-type: none"> <li>• Describe (orally and in writing) a distribution represented by a dot plot, including informal observations about its center and spread.</li> <li>• Interpret a dot plot to answer (in writing) statistical questions about a data set and to identify (orally) what values are “typical” for the distribution.</li> </ul> <p><b>Lesson 5</b></p> <ul style="list-style-type: none"> <li>• Compare and contrast (orally and in writing) dot plots that represent two different data sets measuring the same quantity, paying attention to the “center” and “spread” of each distribution.</li> <li>• Critique or justify (orally and in writing) claims about the center of a distribution represented on a dot plot.</li> </ul> <p><b>Lesson 6</b></p> <ul style="list-style-type: none"> <li>• Compare and contrast (orally) dot plots and histograms in terms of how useful they are for answering different statistical questions.</li> <li>• Create a histogram to represent a data set.</li> <li>• Interpret a histogram to answer (in writing) statistical questions about a data set.</li> </ul> <p><b>Lesson 7</b></p> <ul style="list-style-type: none"> <li>• Compare and contrast (in writing) histograms that represent two different data sets measuring the same quantity.</li> <li>• Critique (orally) a description of a distribution, recognizing that there are multiple valid ways to describe its center and spread.</li> <li>• Describe (orally and in writing) the distribution shown on a histogram, including making claims about the center and spread.</li> </ul> <p><b>Lesson 8</b></p> <ul style="list-style-type: none"> <li>• Compare and contrast (orally) bar graphs and histograms, recognizing that descriptions of shape, center, and spread don’t pertain to bar graphs.</li> <li>• Describe (orally and in writing) the overall shape and features of a distribution represented on a histogram, including peaks, clusters, gaps, and symmetry.</li> <li>• Identify histograms that display distributions with specific features.</li> </ul>

<p><b>Mean and MAD</b></p>	<p><b>Lesson 9</b></p> <ul style="list-style-type: none"> <li>Comprehend the words “mean” and “average” as a measure of center that summarizes the data using a single number.</li> <li>Explain (using words and other representations) how to calculate the mean for a numerical data set.</li> <li>Interpret diagrams that represent finding the mean as a process of leveling out the data to find a “fair share.”</li> </ul> <p><b>Lesson 10</b></p> <ul style="list-style-type: none"> <li>Calculate and interpret (orally and in writing) distances between data points and the mean of the data set.</li> <li>Interpret diagrams that represent the mean as a “balance point” for both symmetrical and non-symmetrical distributions.</li> <li>Represent the mean of a data set on a dot plot and interpret it in the context of the situation.</li> </ul> <p><b>Lesson 11</b></p> <ul style="list-style-type: none"> <li>Calculate the mean absolute deviation (MAD) for a data set and interpret what it tells us about the situation.</li> <li>Compare and contrast (in writing) distributions that have the same mean, but different amounts of variability.</li> <li>Comprehend that “mean absolute deviation (MAD)” is a measure of variability, i.e., a single number summarizing how spread out the data set is.</li> </ul> <p><b>Lesson 12</b></p> <ul style="list-style-type: none"> <li>Compare (orally and in writing) the means and mean absolute deviations of different distributions, specifically those with the same MAD but different means.</li> <li>Interpret the mean and mean absolute deviation (MAD) in the context of the data.</li> </ul>
<p><b>Median and IQR</b></p>	<p><b>Lesson 13</b></p> <ul style="list-style-type: none"> <li>Comprehend that the “median” is another measure of center, which uses the middle of all the values in an ordered list to summarize the data.</li> <li>Identify and interpret the median of a data set given in a table or on a dot plot.</li> <li>Informally estimate the center of a data set and then compare (orally and in writing) the mean and median with this estimate.</li> </ul> <p><b>Lesson 14</b></p> <ul style="list-style-type: none"> <li>Choose which measure of center to use to describe a given data set and justify (orally and in writing) the choice.</li> <li>Explain (orally) that the median is a better estimate of a typical value than the mean for distributions that are not symmetric or contain values far from the center.</li> <li>Generalize how the shape of the distribution affects the mean and median of a data set.</li> </ul> <p><b>Lesson 15</b></p> <ul style="list-style-type: none"> <li>Calculate the range and interquartile range (IQR) of a data set and interpret (orally and in writing) what they tell us about the situation.</li> <li>Comprehend that “interquartile range (IQR)” is another measure of variability that describes the span of the middle half of the data.</li> <li>Identify and interpret (in writing) the numbers in the five-number summary for a data set, i.e., the minimum, first quartile (Q1), median (Q2), third quartile (Q3), and maximum.</li> </ul> <p><b>Lesson 16</b></p> <ul style="list-style-type: none"> <li>Compare and contrast (orally) a dot plot and a box plot that represent the same data set.</li> <li>Create a box plot to represent a data set.</li> <li>Describe (orally) the parts of a box plot that correspond with each number in the five-number summary, the range, and the IQR of a data set.</li> </ul> <p><b>Lesson 17</b></p> <ul style="list-style-type: none"> <li>Compare and contrast (orally and in writing) box plots that represent different data sets, including ones with the same median but very different IQRs and vice versa.</li> <li>Determine what information is needed to solve problems about comparing box plots. Ask questions to elicit that information.</li> <li>Interpret a box plot to answer (orally) statistical questions about a data set.</li> </ul>
<p><b>Let's Put it to Work</b></p>	<p><b>Lesson 18</b></p> <ul style="list-style-type: none"> <li>Recognize that different graphical displays offer different insights into a distribution. Choose an appropriate graphical display to represent a data set, and justify the choice (orally and in writing).</li> <li>Recognize that different measures of center and variability offer different insights into a data set. Choose an appropriate measure of center and variability to describe a data set, and justify the choice (orally and in writing).</li> </ul>
<p><b>Section</b></p>	<p><b>Teacher-facing learning goals</b></p>

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Differentiated Instruction

Technology Integration

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21st Century Skills

Positive Behavior

CASEL

Collaborative for Academic, Social, and Emotional Learning

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Resources

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Teacher Notes and Reflections

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