Unit 8: Data Sets and Distributions

Content Area: **Mathematics**
Course(s): **Math - Grade 6**
Time Period: **April**
Length: **21 days**
Status: **Published**

Unit Overview

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.

Transfer

Students will be able to independently use their learning to solve real world situations including:

- finding the measures of center and measures of variation of data sets.
- interpreting graphs of data sets.

Meaning

Understandings

Students will understand that:

- the mean, median, mode, and range are used to describe data sets.
- data sets can be plotted in multiple ways.
- the distribution of a data set is described by its center, spread, and overall shape.
- there is a difference between questions that are statistical in nature and those that are not.

Essential Questions

How are the measures of center and measures of variation helpful in describing data?

Why is it important to carefully evaluate graphs?

Application of Knowledge and Skill

Students will know...

- mean, median, and mode are measures of center
- range, interquartile range, and mean absolute deviation are measures of variability.
- the distribution is the arrangement of the values in a data set.
- that different graphs can be used to illustrate the same data set.

Students will be skilled at...

• identify statistical questions.

• Determine if questions anticipate variability in the data related to the question and account for it in the answers.

• Represent a set of data collected to answer a statistical question and describe it by its center, spread, and overall shape.

• Represent and explain the difference between measures of center and measures of variability.

• Display numerical data in plots on a number line.

• Display numerical data in dot plots.

• Display numerical data in histograms.

• Display numerical data in box plots.

• Use language to summarize numerical data sets in relation to their context.

• Report the number of observations.

• Describe the nature of the attribute under investigation.

• Give quantitative measures of center and variability 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.

• Relate the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Learning Goal

Develop understanding of statistical variability.

Summarize and describe distributions.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.6	Attend to precision.
MA.K-12.8	Look for and express regularity in repeated reasoning.

Vocabulary

numerical data, categorical data, dot plot, statistical question, variability, distribution, frequency, center, spread, histogram, average, mean, measure of center, mean absolute deviation, median, range, quartile, interquartile range, box plot

Daily Target- Lesson 1

- Ask survey questions (orally) and record responses (in writing). Include units of measurement when reporting numerical data (orally and in writing).
- Comprehend and use the terms "numerical" and "categorical" to describe data sets (orally and in writing).
- Interpret various representations of data sets and determine whether it is reasonable that a verbal description represents a given numerical data set.

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MA.6.SP.B	Summarize and describe distributions.

Daily Target- Lesson 2

- Justify (orally) whether a question is "statistical" based on whether variability is expected in the data that could be collected.
- Match survey questions to data sets representing possible responses and justify (in writing) why they match.

MA.6.SP.A	Develop understanding of statistical variability.
MA.6.SP.A.1	Recognize a statistical question as one that anticipates variability in the data related to the

question and accounts for it in the answers.

| MA.6.SP.B | Summarize and describe distributions. |
| MA.6.SP.B.5b | Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. |

Daily Target- Lesson 3

- Comprehend the word "frequency" to refer to the number of times a particular value occurs in a data set.
- Create and interpret a dot plot to answer statistical questions about a numerical data set.
- 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.

MA.6.SP.A.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
MA.6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
MA.6.SP.B.5a	Reporting the number of observations.
MA.6.SP.B.5b	Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

Daily Target- Lesson 4

- Describe (orally and in writing) a distribution represented by a dot plot, including informal observations about its center and spread.
- 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.

MA.6.SP.A.2	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
MA.6.SP.B	Summarize and describe distributions.
MA.6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
MA.6.SP.B.5a	Reporting the number of observations.

Daily Target- Lesson 5

- 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.
- Critique or justify (orally and in writing) claims about the center of a distribution represented on a dot plot.

| MA.6.SP.A.2 | Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. |
| MA.6.SP.B | Summarize and describe distributions. |

| MA.6.SP.B.4 | Display numerical data in plots on a number line, including dot plots, histograms, and box plots. |
| MA.6.SP.B.5b | Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. |

Daily Target- Lesson 6

- Compare and contrast (orally) dot plots and histograms in terms of how useful they are for answering different statistical questions.
- Create a histogram to represent a data set.
- Interpret a histogram to answer (in writing) statistical questions about a data set.

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MA.6.SP.A.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
MA.6.SP.A.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.
MA.6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
MA.6.SP.B.5b	Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

Daily Target- Lesson 7

- Compare and contrast (in writing) histograms that represent two different data sets measuring the same quantity.
- Critique (orally) a description of a distribution, recognizing that there are multiple valid ways to describe its center and spread.
- Describe (orally and in writing) the distribution shown on a histogram, including making claims about the center and spread.

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MA.6.SP.A.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
MA.6.SP.A.2	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
MA.6.SP.B	Summarize and describe distributions.
MA.6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
MA.6.SP.B.5b	Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

Daily Target- Lesson 8

- Compare and contrast (orally) bar graphs and histograms, recognizing that descriptions of shape, center, and spread don't pertain to bar graphs.
- Describe (orally and in writing) the overall shape and features of a distribution represented on a histogram, including peaks, clusters, gaps, and symmetry.
- Identify histograms that display distributions with specific features.

| MA.6.SP.A.2 | Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. |
| MA.6.SP.B.4 | Display numerical data in plots on a number line, including dot plots, histograms, and box plots. |

Daily Target- Lesson 9

- Comprehend the words "mean" and "average" as a measure of center that summarizes the data using a single number.
- Explain (using words and other representations) how to calculate the mean for a numerical data set.
- Interpret diagrams that represent finding the mean as a process of leveling out the data to find a "fair share."

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MA.6.SP.A.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.
MA.6.SP.B	Summarize and describe distributions.
MA.6.SP.B.5c	Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), 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.

Daily Target- Lesson 10

- Calculate and interpret (orally and in writing) distances between data points and the mean of the data set.
- Interpret diagrams that represent the mean as a "balance point" for both symmetrical and non-symmetrical distributions.
- Represent the mean of a data set on a dot plot and interpret it in the context of the situation.

| MA.6.SP.A.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. |
| MA.6.SP.B.5c | Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), 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. |

Daily Target- Lesson 11

- Calculate the mean absolute deviation (MAD) for a data set and interpret what it tells us about the situation.
- Compare and contrast (in writing) distributions that have the same mean, but different amounts of variability.
- Comprehend that "mean absolute deviation (MAD)" is a measure of variability, i.e., a single number summarizing how spread out the data set is.

MA.6.SP.A.2	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
MA.6.SP.A.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.
MA.6.SP.B.5c	Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), 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.

Daily Target- Lesson 12

- Compare (orally and in writing) the means and mean absolute deviations of different distributions, specifically those with the same MAD but different means.
- Interpret the mean and mean absolute deviation (MAD) in the context of the data.

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MA.6.NS.B.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
MA.6.SP.B.5c	Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), 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.
MA.6.SP.B.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.

Daily Target- Lesson 13

- 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.
- Identify and interpret the median of a data set given in a table or on a dot plot.
- Informally estimate the center of a data set and then compare (orally and in writing) the mean and median with this estimate.

MA.6.SP.B	Summarize and describe distributions.

| MA.6.SP.B.5c | Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), 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. |

Daily Target- Lesson 14

- Choose which measure of center to use to describe a given data set and justify (orally and in writing) the choice.
- 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.
- Generalize how the shape of the distribution affects the mean and median of a data set.

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MA.6.SP.B.5b	Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
MA.6.SP.B.5c	Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), 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.
MA.6.SP.B.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.

Daily Target- Lesson 15

- Calculate the range and interquartile range (IQR) of a data set and interpret (orally and in writing) what they tell us about the situation.
- Comprehend that "interquartile range (IQR)" is another measure of variability that describes the span of the middle half of the data.
- 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.

| MA.6.SP.B.5c | Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), 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. |
| MA.6.SP.B.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. |

Daily Target- Lesson 16

- Compare and contrast (orally) a dot plot and a box plot that represent the same data set.
- Create a box plot to represent a data set.
- 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.

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MA.6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
MA.6.SP.B.5c	Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), 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.
MA.6.SP.B.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.

Daily Target- Lesson 17

- 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.
- Determine what information is needed to solve problems about comparing box plots. Ask questions to elicit that information.
- Interpret a box plot to answer (orally) statistical questions about a data set.

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MA.6.SP.A.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
MA.6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
MA.6.SP.B.5	Summarize numerical data sets in relation to their context, such as by:

Daily Target- Lesson 18

- 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).
- 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).

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MA.6.SP.A.2	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
MA.6.SP.B	Summarize and describe distributions.
MA.6.SP.B.5c	Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), 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.
MA.6.SP.B.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.

Formative Assessment and Performance Opportunities

Use the Lists tab.

- Academic Game
- BrainPop
- Centers
- Class Discussions
- Clickers
- Do Now
- Exit Ticket
- Graphic Organizer
- LinkIT
- Project
- Quiz
- Self-Assessment
- Student Teacher
- Teacher Interview
- Teacher Observation
- Think, Pair, Share

Summative Assessment

Group Presentation

End of Unit Assessment (located in share google drive)

Chapter Project

21st Century Life and Careers

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP1.1	Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP6.1	Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
CAEP.9.2.8.B.6	Demonstrate understanding of the necessary preparation and legal requirements to enter the workforce.
TECH.8.1.8.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.1.8.B.CS2	Create original works as a means of personal or group expression.
TECH.8.1.8.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
TECH.8.1.8.D.CS1	Advocate and practice safe, legal, and responsible use of information and technology.

Accommodations and Modifications

- *Strengths-based Approach:* This activity leverages many natural strengths of students with ADHD, LD, and other concrete learners in terms of its real world context and integration of personal student interest.
- *Strengths-based Approach:* This may be an opportunity for the teacher to highlight this strength in class and allow individual with disability to lead peer interactions/discussions, increasing buy-in.
- *Fine Motor Skills: Peer Tutors.* Pair students with their previously identified peer tutors and allow students who struggle with fine motor skills to dictate creating dot plots as needed.

- *Social-Emotional Functioning*: *Peer Tutors.* Pair students with their previously identified peer tutors.
- *Conceptual Processing: Eliminate Barriers.* Allow students to use calculators to ensure inclusive participation in the activity.
- Teacher provides notes for student(s)
- Teacher will modify test for student(s)
- Students may use graph paper to help organize data
- A word bank can be provided
- Leveled centers can be used
- Small group instruction can be utilized
- Calculators may be used
- Extra Practice Board can be utilized to review pre-requisite skills
- Interactive games/websites may be used to practice skills
- Teacher can conference with student(s) to "check-in"
- Uitilize items in the room to demonstrate skills as they relate to their life (book to wrap for SA, etc.)
- Use coordinate plane to count spaces for area and surface area
- Use blocks to help visualize volume of 3D shapes

- Calculators
- Compass Learning
- Extra Practice Board
- Interactive Games/Websites
- Leveled Centers
- Manipulatives
- Modify Assessments
- Provide Notes
- Teacher Conferences
- Word Bank

Unit Resources

Mr. Morgan's Math Help https://sites.google.com/view/mrmorgansmathhelp/illustrative-mathematics/math-6/unit-1-area-and-surface-area

Interdisciplinary Connections