Unit I: (Inter-Unit) Statistics

Content Area: **Mathematics**
Course(s): **Algebra 1**
Time Period: **year**
Length: **1**
Status: **Published**

Unit Overview

The topics in this unit help students focus on summarizing, representing, and interpreting data on a single count/two categorical or measurement variable/quantitative variables**.** These topics will be covered as appropriate throughout the school year and through do-nows/warm-ups.

Note: The targets in this unit may be addressed in any order.

Transfer

Students will be able to independently use their learning to...

- Relate statistical terminology to real life problems/applications.
- Apply knowledge of discrete mathematics to solve real life problems.
- Apply content to appoprtiate situations, both in and out math class.

Meaning

Understandings

Students will understand that...

- **C**ritical vocabulary will be utilized throughout this course as well as the realm of mathematics.
- Mathematical models can be used to describe physical relationships.
- Data can be represented in different forms and the best representation of the data will depend on the type of data —quantitative or qualitative
- The way real-world data is collected may yield misleading results.

Essential Questions

Students will keep considering...

- How can critical vocabulary terms be used to better enhance the understanding of mathematics?
- How can we use mathematical models to describe physical relationships?
- How can data be represented efficiently and effectively?
- How can different measures be used to interpret and compare sets of data?
- How does the way data is analyzed or communicated influence the way it is interpreted?

Application of Knowledge and Skill

Students will know...

Students will know...

- Statistical terminology related to dot plots, stem and leaf plots, histograms, box plots, and measures of central tendency
- How to describe various types of graphs and data displays
- What outliers are, and how they can effect data
- When it might be most appropriate to use mean, median or mode to describe a measure of central tendency
- How to interpret data based on spreadsheets, tables, and graphs
- Algebraic and technological methods to fit linear, exponential, and quadratic functions
- What is meant by correlation and causation

Students will be skilled at...

Students will be skilled at...

- Constructing dot plots, histograms, and box plots on a real number line
- Constructing stem and leaf plots
- Calculating mean, median, mode, and range of data sets
- Identifying outliers and their effects on the data
- Creating scatter plots
- Distinguishing between correlation and causation

Academic Vocabulary

histogram	outlier	scatter plot	mean	median	stem-and-leaf plot	line graph
Mode	range	Slope	Constant	Y-intercept	frequency table	interquartile range (IQR)
Coefficients	random sample	Linear Programming	Box plots	Dot plots	third quartile	first quartile
bar graph	box-and-whisker plot	circle graph	cumulative frequency	frequency	quantitative	qualitative

Stats Learning Goal

- SWBAT summarize, represent, and interpret data on a single count or measurement variable.

Target 1 - Organizing and Displaying Data (Level of Difficulty: Comprehension)

- SWBAT choose a table or graph to display data
- SWBAT organize data in tables and graphs

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.S-ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.

Target 2 - Stem & Leaf Plots and Histograms (Level of Difficulty: Comprehension)

- SWBAT create and interpret frequency tables and histograms.
- SWBAT create and interpret stem and leaf plots.

MA.S-ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.

Target 3 - Box and Whisker Plots (Level of Difficulty: Comprehension)

- SWBAT create and interpret box-and-whisker plots.

MA.S-ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
MA.S-ID.A.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
MA.S-ID.A.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.

Target 4 - Data Distributions (Level of Difficulty: Comprehension)

- SWBAT describe the central tendency of a data set.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.S-ID.A.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.S-ID.A.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.

Target 5 - Misleading Graphs and Statistics (Level of Difficulty: Comprehension)

- SWBAT recognize misleading graphs and statistics.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.S-IC.B.6	Evaluate reports based on data.

Target 6 - Dot Plots (Level of Difficulty: Comprehension)

- SWBAT create and interpret dot plots.
- SWBAT use a dot plot to describe the shape of a data distribution.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.S-ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
MA.S-ID.A.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.S-ID.A.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
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MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.

Proficiency Scale

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.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP3.1	Career-ready individuals understand the relationship between personal health, workplace performance and personal well-being; they act on that understanding to regularly practice healthy diet, exercise and mental health activities. Career-ready individuals also take regular action to contribute to their personal financial well-being, understanding that personal financial security provides the peace of mind required to contribute more fully to

	their own career success.
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.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP7.1	Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.
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.9.2.12.C.2	Modify Personalized Student Learning Plans to support declared career goals.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.

Technology

TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.12.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.12.D.CS2	Demonstrate personal responsibility for lifelong learning.
TECH.8.1.12.E.1	Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.
TECH.8.1.12.E.CS2	Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.1.12.F.1	Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.

TECH.8.1.12.F.CS1	Identify and define authentic problems and significant questions for investigation.
TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.
TECH.8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world.

Formative Assessment and Performance Opportunities

- Academic Games
- Class discussions
- Closures
- Do nows
- Group work
- homework
- Think-pair-share

Summative Assessment

- Benchmark Assessments
- Chapter Tests
- End of Unit Projects
- Performance Tasks
- Quizzes

Accommodations and Modifications

- 504 accommodations
- challenge problems
- Common Core Reference Workbook: 10-1 (Organizing and Displaying Data)
- Common Core Reference Workbook: 10-2 (Frequency and Histogram)
- Common Core Reference Workbook: 10-3 (Data Distributions)
- Common Core Reference Workbook: 10-5 (Experimental Probability)
- Common Core Reference Workbook: 10-6 (Theoretical Probability)
- heterogeneous groupings
- IEP's
- scaffolding questions
- small group instruction
- use of technology: TI-83 graphing calculator to find specific values

Unit Resources

Holt McDougal Algebra 1 10.1; 10.2; 10.3; 10.3 extension; 4.8

- Explorations in Core Math for Common Core: Algebra 1 (Holt McDougal)
- https://www.desmos.com/
- Kuta software
- NCTM website
- online textbook resources
- PARCC/NJSLA released questions

Interdisciplinary Connections

Real World applications involving experimental and theoretical probabilty can be used to determine outcomes (flipping a coin, cards, inherited traits, etc.) MA.9-12.S-MD.D.7

SCI.HS-LS4-3	Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.