

**Standard: - New Jersey Student Learning Standards: S-ID, S-IC, S-MD
Statistics (Chapter 12)****Strand:****S-ID: Interpreting Categorical and Quantitative Data****Summarize, represent, and interpret data on a single count or measurement variable.**

1. Represent data with plots on the real number line (dot plots, histograms, and box plots).
2. Use statistics appropriate to the shape of the data distributions to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
4. *Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.*

S-IC: Making Inferences and Justifying Conclusions**Making inferences and justifying conclusions.**

1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.

Make inferences and justify conclusions from sample surveys, experiments, and observational studies.

3. Recognize the purposes and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
4. Use data from a sample survey to estimate a population mean or proportion, develop a margin of error through the use of simulations models for random sampling.
5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant
6. Evaluate reports based on data

S-MD: Using Probability to Make Decisions**Calculate expected values and use them to solve problems**

4. (+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically, find the expected values. *For example, find a current data distribution on the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?*

Use probability to evaluate outcomes of decisions

5. (+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.
- Find the expected payoff for a game of chance. *For example, find the expected winning from a state lottery ticket or a game at a fast-food restaurant.*
 - Evaluate and compare strategies on the basis of expected values. *For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.*
6. (+) Use probabilities to make fair decisions (e.g., drawing by lots, using random number generator).
7. (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

Curriculum aligned with: 2009 New Jersey Core Curriculum Content Standards for 21st Century Skills (9.1 A-F)

21st Century Theme: Global Awareness , Financial, economic, business and entrepreneurial literacy x Civic literacy , Health literacy Environmental Literacy

21st Century Skills: Critical Thinking & Problem Solving x Creativity and Innovation , Collaboration, Teamwork and Leadership , Cross-Cultural Understanding and Interpersonal Communications Communication and Media Fluency , Accountability, Productivity and Ethics

Interdisciplinary Connection: Math=MA, English=ELA, Science=SCI, Social Studies=SS, Physical Education=PE, Art=ART, Music=MU, Technology=TECH, World Language=WL Business = BU

Essential Questions	Enduring Understandings	Activities, Investigation, and Student Experiences
1. Why do you order the data to calculate the	<i>Students will understand....</i>	Task 1 SCI

<p>median and mode but not the mean?</p> <p>2. How could the sampling method be improved to get a more representative sample?</p> <p>3. If the population mean and the sample mean stay the same, but the standard deviation increases, does z increase or decrease? Does that mean that it is easier or more difficult to reject the null hypothesis when the standard deviation is greater?</p> <p>4. If two normally distributed data sets have the same mean but one has a standard deviation of 7, how will the graphs differ</p>	<ul style="list-style-type: none">● Sampling Techniques and Misuses of Statistics● Frequency Distributions and Statistical Graphs● Measures of Central Tendency	<p>In a study of patients with cold symptoms, each patient was found to have improved symptoms after taking honey. Therefore, honey cures the common cold.</p> <p>Answer: The patients may have improved without taking honey.</p> <p>Task 2BU</p> <p>The SAT is designed so that scores are normally distributed with a mean of 500 and a standard deviation of 100.</p> <p>a) What percent of SAT scores are between 300 and 500?</p> <p>b) What is the probability that an SAT score is below 700?</p> <p>c) What is the probability that an SAT score is less than 400 or greater than 600?</p> <p>Answer: a) about 47.7% b) about 97.7% c) about 31.8%</p> <p>Task 3</p> <p>Determine the median of the following set of data. 7, 8, 8, 8, 8, 10</p> <p>Answer: Since there are an even number of pieces of data and they are already ranked we need to add the two pieces of data in the middle and then divide by two.</p>
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Content Statements	Cumulative Progress Indicators	$8 + 8 = 16$ $16/2 = 8$
<p><i>Students will know...</i></p> <ul style="list-style-type: none"> ● Sampling techniques ● Misuses of statistics ● Frequency distributions ● Histograms, frequency polygons, and stem-and-leaf displays. ● Mode, median, mean, and midrange ● Percentiles and quarterlies ● Range and standard deviation 	<ul style="list-style-type: none"> ● Tests ● Quizzes ● Practice problems for homework ● Projects ● Worksheets ● In-class programs 	<p>Modifications and/or Accommodations:</p> <ul style="list-style-type: none"> ● Special Education: Utilize a multi-sensory (VAKT) approach during instruction, provide alternate presentations of skills by varying the method (repetition, simple explanations, additional examples, modeling, etc.), modify test content and/or format, allow students to retake test for additional credit, provide additional times and preferential seating as needed, review, restate and repeat directions, provide study guides, and/or break assignments into segments of shorter tasks. ● English Language Learners: Extend time requirements, preferred seating, positive reinforcement, check often for understanding/review, oral/visual directions/prompts when necessary, supplemental materials including use of online bilingual dictionary, and modified assessment and/or rubric. ● Students at Risk of School Failure: Deliver instruction utilizing varied learning styles including audio, visual, and tactile/kinesthetic, provide individual instruction as needed, modify assessments and/or rubrics, repeat instructions as needed.
<p>Desired Results</p>		<p>Gifted Students: Create an enhanced set of introductory activities, integrate active teaching/learning opportunities, incorporate authentic components, propose interest-based extension activities, and connect student to related talent development opportunities.</p>
<ul style="list-style-type: none"> ● Sampling Techniques and Misuses of Statistics ● Frequency Distributions and Statistical Graphs ● Measures of Central Tendency 		<p>Spot Light On: <i>Use random response strategies.</i></p>

Standards for Mathematical Practices	Teacher Resources
<ol style="list-style-type: none">1. Make sense of problems and persevere in solving them.2. Reason abstractly and quantitatively.3. Construct viable arguments and critique the reasoning of others.4. Model with mathematics.5. Use appropriate tools strategically.6. Attend to precision.7. Look for and make use of structure.8. Look for and express regularity in repeated reasoning.	<p>Mymathlab.com http://achievethecore.org https://learnzillion.com https://www.khanacademy.org/ https://www.desmos.com/ http://www.ixl.com</p>

LGBT and Disabilities Law: *N.J.S.A. 18A:35-4.35*

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The mission is to ensure that every student is able to see themselves in our rich and diverse history.

Social and Emotional Learning: Competencies	Social and Emotional Learning: Sub-Competencies
Self-Awareness Social Awareness Self-Management Relationship Skills Responsible Decision-Making	<ul style="list-style-type: none"> ● Recognizing the importance of self-confidence in handling daily tasks and challenges. ● Demonstrate an awareness of the expectations for social interactions in a variety of ways. ● Demonstrate an understanding of the need for mutual respect when viewpoints differ. ● Recognize the skills needed to establish and achieve personal and educational goals. ● Utilize positive communication and social skills to interact effectively with others. ● Develop, implement, and model effective problem solving and critical thinking skills.

New Jersey Legislative Statutes and Administrative Code (place an "X" before each law/statute if/when present within the curriculum map)						
Amistad Law: <i>N.J.S.A. 18A 52:16A-88</i>	Holocaust Law: <i>N.J.S.A. 18A:35-28</i>	X	LGBT and Disabilities Law: <i>N.J.S.A. 18A:35-4.35</i>	X	Diversity & Inclusion: <i>N.J.S.A. 18A:35-4.36a</i>	Standards in Action: <i>Climate Change</i>