Winslow Township School District
Statistics I
Unit 1 – Sampling Techniques and Data Analysis

Overview: In this unit, students will be able to identify the population and sample in a sample survey.
Students will explain how bad sampling leads to bias. Students will distinguish between simple random sample, stratified random
sample, systematic sample and cluster sample. Students will distinguish between an observational study and an experiment. Students
will be able to distinguish between qualitative and quantitative variables describe the relationship between two quantitative variables.
Students will be able to calculate and interpret measures of center in context.

Unit 1 – **Sampling Techniques and Data Analysis**

Overview	Standards	Unit Focus	Essential Questions
Unit 1	S.ID.A.1 S.ID.A.2 S.ID.A.3 S.ID.A.4 S.ID.B.5 S.ID.B.6	• Represent data with plots on the real number line (dot plots, histograms, and box plots). • 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. • Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). • 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. • Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. • Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.	• How can poor sampling leads to bias? • How can one distinguish between the simple random sample, stratified random sample, and cluster sample? • How is the relationship between two quantitative variables described? • What is data and how do we understand and communicate data? • How can graphical displays be manipulated to present misleading information? • How are diverse groups that have nothing in common compared? • Why is the normal distribution essential to the study of statistics, and how does it apply to the real world? • How do we obtain data? Why is it important? • How can bias be identified and prevented? • To what extent does data collection methodology affect results?
Unit 1: *Enduring* *Understandings*	The Who, What, Where, Why, and How of the data are important information that must be depicted in each given data set. The shape, center, and spread should be described for every distribution. The normal distribution is used to model the spread of data. Careful planning is essential to obtaining valid data. Clarifying the question leads to the appropriate methodology. The analysis is only as good as the data. Well-designed experiments can allow us to reach appropriate cause-and-effect conclusions.		

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Curriculum Unit 1	Standards		Pacing	
			Days	**Unit Days**
Unit 1:	S.ID.A.1	• Represent data with plots on the real number line (dot plots, histograms, and box plots).	15	45
	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.		
	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).	15	
	S.ID.A.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.ID.B.5	• Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	5	
	S.ID.B.6	• Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.	5	
	Assessment, Re-teach and Extension		5	

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Unit 1 Statistics1	
District/School Formative Assessment Plan	**District/School Summative Assessment Plan**
Pre-Assessment Quizzes, Tests Projects Exit Tickets Daily Monitoring	Unit Benchmark SAT Testing AP Testing
Resources	**Activities**
Textbooks: **Statistics**, Peck,Short, Olsen, 2019, Cengage Learning, Inc. ➢ TI 84+ ➢ Smartboard Technology ➢ Desmos ➢ https://www.khanacademy.org/math/statistics ➢ **Diversity, Equity & Inclusion Educational Resources** https://www.nj.gov/education/standards/dei/	• Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. • Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. • Emphasize linear, quadratic, and exponential models. • Informally assess the fit of a function by plotting and analyzing residuals. • Fit a linear function for a scatter plot that suggests a linear association. • Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. • Compute (using technology) and interpret the correlation coefficient of a linear fit. • Distinguish between correlation and causation. • Represent data with plots on the real number line (dot plots, histograms, and box plots). • 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.

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Instructional Best Practices and Exemplars	
1. Identifying similarities and differences	6. Cooperative learning
2. Summarizing and note taking	7. Setting objectives and providing feedback
3. Reinforcing effort and providing recognition	8. Generating and testing hypotheses
4. Homework and practice	9. Cues, questions, and advance organizers
5. Nonlinguistic representations	10. Manage response rates

9.1 Personal Financial Literacy, 9.2 Career Awareness, Exploration, Preparation and Training, 9.3 21st Century Life and Careers & 9.4 Life Literacies and Key Skills

9.3.ST.2: Use technology to acquire, manipulate, analyze and report data.
9.3.ST-ET.5: Apply the knowledge learned in STEM to solve problems.
9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments.

The implementation of the 21st Century skills and standards for students of the Winslow Township District is infused in an interdisciplinary format in a variety of curriculum areas that include, English language Arts, Mathematics, School Guidance, Social Studies, Technology, Visual and Performing Arts, Science, Physical Education and Health, and World Language.

Additional opportunities to address 9.1, 9.2 & 9.4:

Philadelphia Mint

https://www.usmint.gov/learn/kids/resources/educational-standards

Different ways to teach Financial Literacy.

https://www.makeuseof.com/tag/10-interactive-financial-websites-teach-kids-money-management-skills/

Modifications for Special Education/504

Students with special needs: The students' needs will be addressed on an individual and grade level using a variety of modalities. Accommodations will be made for those students who need extra time to complete assignment. Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.

- Small group instruction and demonstration
- Electronic, printed and verbal instruction
- One-on-one demonstration
- Leveled informational texts and videos via online
- Modeling and guided practice
- Read directions aloud
- Repeat, rephrase and clarify directions
- Extended time as needed
- Break down assignments into smaller units
- Provide shortened assignments
- Modify testing format
- Preferential seating
- Graphic organizers
- Study guides, study aids and re-teaching as needed

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Modifications for At-Risk Students
Formative and summative data will be used to monitor student success. At first signs of failure, student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations. More time will be made available with a certified instructor to aid students in reaching the standards. • Contact parents, guidance & child study if students are in danger of failing. • Provide an assignment sheet with step-by-step instructions as well as specifications for each project. • Provide design templates. • Provide study guides. • Provide extended time for written assessments. • Extended time as needed • Read directions aloud • Assist with organization • Use of computer to create, edit and store student work. • Emphasize/highlight key concepts • Recognize success • Provide timelines for work completion • Break down multi-step tasks into smaller chunks • Provide copy of class notes and graphic organizer

English Language Learners	Modifications for Gifted Students
All WIDA Can Do Descriptors can be found at this link: https://wida.wisc.edu/teach/can-do/descriptors ☐ Grades 9-12 WIDA Can Do Descriptors: ☐ Listening ☐ Speaking ☐ Reading ☐ Writing ☐ Oral Language Students will be provided with accommodations and modifications that may include: • Relate to and identify commonalities in Architectural & Engineering studies in student's home country • Use sentence/paragraph frames to assist with writing reports. • Work with a partner to develop and understand written and design projects • Provide extended time for written responses. • Assist with organization • Use of computer for quick translation • Emphasize/highlight key concepts • Teacher Modeling • Peer Modeling • Label Classroom Materials - Word Walls	Students excelling in mastery of standards will be challenged with complex, high level challenges related to the topic. • Raise levels of intellectual demands • Require higher order thinking, communication, and leadership skills • Differentiate content, process, or product according to student's readiness, interests, and/or learning styles • Provide higher level texts • Expand use of open-ended, abstract questions • Critical and creative thinking activities that provide an emphasis on research and in-depth study • Enrichment Activities/Project-Based Learning/ Independent Study Additional Strategies may be located at the links: ❖ Gifted Programming Standards ❖ Webb's Depth of Knowledge Levels and/or Revised Bloom's Taxonomy ❖ REVISED Bloom's Taxonomy Action Verbs

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Interdisciplinary Connections
ELA **NJSLSA.SL1** Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. **NJSLSA.SL2** Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally. **NJSLSA.R7.** Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. **NJSLSA.R10.** Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed. **NJSLSA.W4.** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience **RI.9-10.1** Accurately cite strong and thorough textual evidence, (e.g., via discussion, written response, etc.) and make relevant connections, to support analysis of what the text says explicitly as well as inferentially, including determining where the text leaves matters uncertain. **RI.9-10.2** Determine a central idea of a text and analyze how it is developed and refined by specific details; provide an objective summary of the text. **W.9-10.6** Use technology, including the Internet, to produce, share, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. **SL.9-10.5** Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance findings, reasoning, and evidence and to add interest. **SL.9-10.6** Adapt speech to a variety of contexts and tasks, demonstrating command of formal English. **RI.11-12.1** Accurately cite strong and thorough textual evidence, (e.g., via discussion, written response, etc.), to support analysis of what the text says explicitly as well as inferentially, including determining where the text leaves matters uncertain. **RI.11-12.2** Determine two or more central ideas of a text, and analyze their development and how they interact to provide a complex analysis; provide an objective summary of the text.

Integration of Computer Science and Design Thinking NJSLS 8
8.1.12.AP.1: Design algorithms to solve computational problems using a combination of original and existing algorithms.
8.1.12.AP.2: Create generalized computational solutions using collections instead of repeatedly using simple variables.
8.1.12.AP.5: Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.
8.1.12.AP.8: Evaluate and refine computational artifacts to make them more usable and accessible.
8.2.12.EC.3: Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience.