

Winslow Township School District
Mathematics Curriculum – Algebra I
Unit 4

Overview	Standards for Mathematical Content		Unit Focus	Standards for Mathematical Practice
Unit 4 Modeling with Statistics	<ul style="list-style-type: none"> ● S.ID.A.1 ● S.ID.A.2 ● S.ID.A.3 ● S.ID.B.5 ● S.ID.B.6 	<ul style="list-style-type: none"> ● F.IF.B.4* ● F.IF.B.5* 	<ul style="list-style-type: none"> ● Summarize, represent, and interpret data on a single count or measurement variable ● Summarize, represent, and interpret data on two categorical and quantitative variables ● Interpret functions that arise in applications in terms of the context 	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively.
Unit 4: Suggested Open Educational Resources	S.ID.A.1-3 Haircut Costs S.ID.A.1-3 Speed Trap S.ID.A.2-3 Measuring Variability in a Data Set S.ID.A.3 Identifying Outliers S.ID.B.5 Support for a Longer School Day? S.ID.B.6 Laptop Battery Charge 2 F.IF.B.4 The Aquarium	F.IF.B.4 Containers F.IF.B.4-5 The Canoe Trip, Variation 2 F.IF.C.8a Springboard Dive F.IF.C.8a Which Function? F.IF.B.9 Throwing Baseballs F.IF.B.6 Mathemafish Population F.LE.A.3 Population and Food Supply	F.BF.B.3 Identifying Even and Odd Functions F.BF.B.3 Transforming the graph of a function A.REI.D.11 Introduction to Polynomials – College Fund A.APR.B.3 Graphing from Factors 1 N.RN.B.3 Operations with Rational and Irrational Numbers	MP.3 Construct viable arguments and critique the reasoning of others. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.

Major Supporting Additional (Identified by PARCC Model Content Frameworks).

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Curriculum Unit 4	Standards		Pacing	
			Days	Unit Days
Unit 4 Modeling with Statistics	<ul style="list-style-type: none"> ● S.ID.A.1 ● S.ID.A.2 ● S.ID.A.3 ● S.ID.B.5 ● S.ID.B.6 	<p>Represent data with plots on the real number line (dot plots, histograms, and box plots). Compare center and spread of two or more data sets, interpreting differences in shape, center, and spread in the context of the data, taking into account the effects of outliers. Summarize and interpret categorical data for two categories in two-way frequency tables; explain possible associations and trends in the data. Fit functions to data using technology, plot residuals and informally assess the fit of linear and non-linear functions by analyzing residuals.</p>	22	45
	<ul style="list-style-type: none"> ● F.IF.B.4* ● F.IF.B.5* 	<p>Interpret key features of functions from graphs and tables. Given a verbal description of the relationship, sketch the graph of a function, showing key features and relating the domain of the function to its graph.</p>	13	
	Assessment, Re-teach and Extension		10	

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Unit 4 Algebra I		
Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
<ul style="list-style-type: none"> ● S.ID.A.1. Represent data with plots on the real number line (dot plots, histograms, and box plots). 	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>MP.6 Attend to precision.</p>	<p>Concept(s): No new concept(s) introduced</p> <p>Students are able to:</p> <ul style="list-style-type: none"> ● represent data with dot plots on the real number line. ● represent data with histograms on the real number line. ● represent data with box plots on the real number line. <p>Learning Goal 1: Represent data with plots (dot plots, histograms, and box plots) on the real number line.</p>
<ul style="list-style-type: none"> ● 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). 	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>MP.6 Attend to precision.</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> ● Appropriate use of a statistic depends on the shape of the data distribution. ● Standard deviation <p>Students are able to:</p> <ul style="list-style-type: none"> ● represent two or more data sets with plots and use appropriate statistics to compare their center and spread. ● interpret differences in shape, center, and spread in context. ● explain possible effects of extreme data points (outliers) when summarizing data and interpreting shape, center and spread. <p>Learning Goal 2: Compare center and spread of two or more data sets, interpreting differences in shape, center, and spread in the context of the data, taking into account the effects of outliers.</p>
<ul style="list-style-type: none"> ● 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. 	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>MP.7 Look for and make use of structure.</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> ● Categorical variables represent types of data which may be divided into groups. <p>Students are able to:</p> <ul style="list-style-type: none"> ● construct two-way frequency tables for categorical data. ● interpret joint, marginal and conditional relative frequencies in context. ● explain possible associations between categorical data in two-way tables. ● identify and describe trends in the data. <p>Learning Goal 3: Summarize and interpret categorical data for two categories in two-way frequency tables; explain possible associations and trends in the data.</p>

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<ul style="list-style-type: none"> ● S.ID.B.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. S.ID.B.6a. Fit a function to the data (including the use of technology); 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. S.ID.B.6b. Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology. 	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>MP.6 Attend to precision.</p>	<p>Concept(s): No new concept(s) introduced Students are able to:</p> <ul style="list-style-type: none"> ● fit a function to data using technology. ● solve problems using functions fitted to data (prediction equations). ● interpret the intercepts of models in context. ● plot residuals of linear and non-linear functions. ● analyze residuals in order to informally evaluate the fit of linear and non-linear functions. <p>Learning Goal 4: Fit functions to data using technology, plot residuals and informally assess the fit of linear and non-linear functions by analyzing residuals.</p>
<ul style="list-style-type: none"> ● F.IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i> ● F.IF.B.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. <i>For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.</i> 	<p>MP.4 Model with mathematics.</p> <p>MP.6 Attend to precision.</p>	<p>Concept(s): No new concept(s) introduced Students are able to:</p> <ul style="list-style-type: none"> ● interpret maximum/minimum and intercepts of functions from graphs and tables in the context of the problem. ● sketch graphs of functions given a verbal description of the relationship between the quantities. ● identify intercepts and intervals where function is increasing/decreasing. ● determine the practical domain of a function . <p>Learning Goal 5: Interpret key features of functions from graphs and tables. Given a verbal description of the relationship, sketch the graph of a function, showing key features and relating the domain of the function to its graph.</p>

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School/District Formative Assessment Plan Pre-Assessment, Quizzes Exit Tickets Daily Monitoring Linkit!	School/District Summative Assessment Plan Unit Benchmark Linkit! Diagnostic
Focus Mathematical Concepts	
<p>Prerequisite skills:</p> <ul style="list-style-type: none"> ● Use graphs of experiences that are familiar to students to increase accessibility and supports understanding and interpretation of proportional relationship. Students are expected to both sketch and interpret graphs including scatter plot. ● Students create an equation with given information from a table, graph, or problem situation. ● Engage students in interpreting slope and intercept using real world applications (e.g. bivariate data). <p>Common Misconceptions:</p> <ul style="list-style-type: none"> ● S.ID.A.1 ● S.ID.A.2 ● S.ID.A.3 <p>Students may believe:</p> <p>That a bar graph and a histogram are the same. A bar graph is appropriate when the horizontal axis has categories and the vertical axis is labeled by either frequency (e.g., book titles on the horizontal and number of students who like the respective books on the vertical) or measurement of some numerical variable (e.g., days of the week on the horizontal and median length of root growth of radish seeds on the vertical). A histogram has units of measurement of a numerical variable on the horizontal (e.g., ages with intervals of equal length).</p> <p>That the lengths of the intervals of a boxplot (min,Q1), (Q1,Q2), (Q2,Q3), (Q3,max) are related to the number of subjects in each interval. Students should understand that each interval theoretically contains one-fourth of the total number of subjects. Sketching an accompanying histogram and constructing a live boxplot may help in alleviating this misconception.</p> <p>That all bell-shaped curves are normal distributions. For a bell-shaped curve to be Normal, there needs to be 68% of the distribution within one standard deviation of the mean, 95% within two, and 99.7% within three standard deviations.</p> <ul style="list-style-type: none"> ● S.ID.B.5 ● S.ID.B.6 <p>Students may believe:</p> <p>That a 45 degree line in the scatterplot of two numerical variables always indicates a slope of 1 which is the case only when the two variables have the same scaling.</p> <p>That residual plots in the quantitative case should show a pattern of some sort. Just the opposite is the case.</p> <ul style="list-style-type: none"> ● F.IF.B.4* ● F.IF.B.5* 	

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Students may believe that it is reasonable to input any x -value into a function, so they will need to examine multiple situations in which there are various limitations to the domains.

Students may also believe that the slope of a linear function is merely a number used to sketch the graph of the line. In reality, slopes have real-world meaning, and the idea of a rate of change is fundamental to understanding major concepts from geometry to calculus.

Fluency Recommendations:

Algebra I students become fluent in solving characteristic problems involving the analytic geometry of lines, such as writing down the equation of a line given a point and a slope. Such fluency can support them in solving less routine mathematical problems involving linearity, as well as in modeling linear phenomena (including modeling using systems of linear inequalities in two variables).

A-APR.A.1 Fluency in adding, subtracting, and multiplying polynomials supports students throughout their work in algebra, as well as in their symbolic work with functions. Manipulation can be more mindful when it is fluent.

A-SSE.A.1b Fluency in transforming expressions and chunking (seeing parts of an expression as a single object) is essential in factoring, completing the square, and other mindful algebraic calculations.

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District/School Tasks		District/School Primary and Supplementary Resources and Technology Integration	
<p>PARCC Released Items http://www.parcc-assessment.org/released-items</p> <p>NJDOE Digital Item Library https://nj.digitalitemlibrary.com/home</p> <p>NJSLA Mathematics Evidence Statements https://docs.google.com/spreadsheets/d/18M5r1jk4P729fTpAlWAzrw1gE6tken233I-Yk0U712M/edit#gid=554025491</p> <p>LinkIt! Form A, B, & C</p>		<p>Textbook HS Flip Book: http://community.ksde.org/Default.aspx?tabid=5646</p> <p>IXL https://www.ixl.com/</p> <p>Khan Academy https://www.khanacademy.org/</p> <p>North Carolina Dept of Ed. Wikispaces: http://maccess.ncdpi.wikispaces.net/High+School</p> <p>PARCC Resources: http://www.parcc-assessment.org/assessments/test-design/mathematics/math-test-specifications-documents</p> <p>Diversity, Equity & Inclusion Educational Resources https://www.nj.gov/education/standards/dei/</p>	
Instructional Best Practices and Exemplars			
<ol style="list-style-type: none"> 1. Identifying similarities and differences 2. Summarizing and note taking 3. Reinforcing effort and providing recognition 4. Homework and practice 5. Nonlinguistic representations 		<ol style="list-style-type: none"> 6. Cooperative learning 7. Setting objectives and providing feedback 8. Generating and testing hypotheses 9. Cues, questions, and advance organizers 10. Manage response rate 	
Vocabulary			
Association	Causation	Histogram	Mean, median
Bivariate data	Correlation	Intercept	Outlier
Box plots	Correlation coefficient	Linear model	Quantitative variables
Categorical variables	Dot plots	Line of best fit	Scatter plot

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9.1 Personal Financial Literacy, 9.2 Career Awareness, Exploration, Preparation and Training & 9.4 Life Literacies and Key Skills

- 9.1.12.CP.1: Summarize how one’s credit history can affect finances, including loan terms, employment, and qualifying for loans.
- 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.12prof.CR3.a).
- 9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8)
- 9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience (e.g., S-ID.B.6b, HS-LS2-4).
- 9.4.12.IML.5: Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2).
- 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/>

Suggested 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 assignments. 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.

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| <ul style="list-style-type: none"> <input type="checkbox"/> Provide the opportunity to re-take tests <input type="checkbox"/> Modify activities/assignments/projects/assessments <input type="checkbox"/> Breakdown activities/assignments/projects/assessments into manageable units <input type="checkbox"/> Additional time to complete activities/assignments/projects/assessments <input type="checkbox"/> Provide an option for alternative activities/assignments/projects/assessments <input type="checkbox"/> Modify Content <input type="checkbox"/> Modify Amount <input type="checkbox"/> Small Group Intervention/Remediation | <ul style="list-style-type: none"> <input type="checkbox"/> Individual Intervention/Remediation <input type="checkbox"/> Additional Support Materials <input type="checkbox"/> Guided Notes <input type="checkbox"/> Graphic Organizers <input type="checkbox"/> Adjust Pacing of Content <input type="checkbox"/> Increase one on one time <input type="checkbox"/> Peer Support <input type="checkbox"/> Other Modifications for Special Education: |
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Suggested Modifications for At-Risk Students	
<p>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</p>	
<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <ul style="list-style-type: none"> <input type="checkbox"/> Provide the opportunity to re-take tests <input type="checkbox"/> Increase one on one time <input type="checkbox"/> Oral prompts can be given <input type="checkbox"/> Using visual demonstrations, illustrations, and models <input type="checkbox"/> Give directions/instructions verbally and in simple written format <input type="checkbox"/> Peer Support <input type="checkbox"/> Modify activities/assignments/projects/assessments <input type="checkbox"/> Additional time to complete activities/assignments/projects/assessments <input type="checkbox"/> Provide an option for alternative activities/assignments/projects/assessments </div> <div style="width: 48%;"> <ul style="list-style-type: none"> <input type="checkbox"/> Modify Content <input type="checkbox"/> Modify Amount <input type="checkbox"/> Adjust Pacing of Content <input type="checkbox"/> Small Group Intervention/Remediation <input type="checkbox"/> Individual Intervention/Remediation <input type="checkbox"/> Additional Support Materials <input type="checkbox"/> Guided Notes <input type="checkbox"/> Graphic Organizers <input type="checkbox"/> Other Modifications for Students At-Risk: </div> </div>	
Suggested for English Language Learners	Suggested Modifications for Gifted Students
<p>All WIDA Can Do Descriptors can be found at this link: https://wida.wisc.edu/teach/can-do/descriptors</p> <ul style="list-style-type: none"> <input type="checkbox"/> Grades 9-12 WIDA Can Do Descriptors: <ul style="list-style-type: none"> <input type="checkbox"/> Listening <input type="checkbox"/> Speaking <input type="checkbox"/> Reading <input type="checkbox"/> Writing <input type="checkbox"/> Oral Language <p>Students will be provided with accommodations and modifications that may include:</p> <ul style="list-style-type: none"> • Relate to and identify commonalities in mathematics studies in student’s home country • Assist with organization • Use of computer • Emphasize/highlight key concepts • Teacher Modeling • Peer Modeling • Label Classroom Materials - Word Walls 	<p>Students excelling in mastery of standards will be challenged with complex, high level challenges related to the topic.</p> <ul style="list-style-type: none"> • 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 <p>Additional Strategies may be located at the links:</p> <ul style="list-style-type: none"> ❖ 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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Suggested Activities

<input type="checkbox"/> Do Now/Warm-Up <input type="checkbox"/> Whole Group <input type="checkbox"/> Small Groups <input type="checkbox"/> Guided Practice	<input type="checkbox"/> Independent Practice	<input type="checkbox"/> Centers <input type="checkbox"/> Intervention/Remediation <input type="checkbox"/> Projects	<input type="checkbox"/> Academic Games <input type="checkbox"/> Other Suggested Activities:
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Interdisciplinary Connections

Big Ideas Real-Life STEM Videos and Performance Tasks

Interdisciplinary Connections: ELA

NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

NJSLSA.W2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content

NJSLSA.L1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking

SL.9-10.4: Present information, findings and supporting evidence clearly, concisely and logically. The content, organization, development and style are appropriate to task, purpose and audience.

NJSLSA.L6: Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression.

Integration of Computer Science and Design Thinking NJSLS 8

8.1.12.IC.1: Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.

8.1.12.IC.2: Test and refine computational artifacts to reduce bias and equity deficits.

8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

8.1.12.AP.8: Evaluate and refine computational artifacts to make them more usable and accessible.

8.2.12.ETW.2: Synthesize and analyze data collected to monitor the effects of a technological product or system on the environment. • 8.2.12.ETW.3: Identify a complex, global environmental or climate change issue, develop a systemic plan of investigation, and propose an innovative sustainable solution.