

Winslow Township School District
Trigonometry/PreCalculus
Unit 1 - Linear and Non-Linear Equations and Transformations

Overview: In this unit, students will understand the concept of a function and use function notation. Interpret functions that arise in applications in terms of the context. Analyze functions using different representations. Students will determine a function's domain and range, relative maximums and relative minimums, and areas of increase/decrease/constant. Students will determine if a function is even, odd, or neither. Students will explore that if given a parent function and a transformed function, they will describe the transformation that occurred. Use these transformations to sketch a new graph or find new points. Students will understand the concept of a non-linear function and use function notation. Interpret non-linear functions that arise in applications in terms of the context and write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.. Students will learn how to add, subtract, multiply and divide functions as well as find composition of functions. Students will explore how to graph, write, solve, divide and apply polynomial functions of higher degree. Students will explore how to graph rational functions in any form, giving the domain of the function and labeling all asymptotes, holes, and intercepts. Students will understand that given the critical information about a rational function, determine an equation or a graph matching this information.

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Overview	Standards	Unit Focus	Essential Questions
<p><u>Unit 1</u></p> <p>Linear and Non-Linear Equations and Transformations</p>	<p>A.CED.A.2 A.APR.B.3 F.BF.B.5 F.IF.B.4 F.LE.A.4 F.LE.4 S.ID.B.6a</p>	<ul style="list-style-type: none"> • Interpret the structure of expressions • Evaluate algebraic expressions • Evaluate absolute value • Find the Domain and Range of a relation • Evaluate a function • Graph functions • Evaluate exponential functions • Graph exponential functions • Evaluate functions with base e 	<ul style="list-style-type: none"> • How can functions be built and represented (verbally, graphically, numerically, and algebraically)? • What is similar and what is different between the many types of functions we can create? • How can we rewrite a mathematical object (an expression, equation, or function) to better understand what the object represents and see the important features of that object? • What techniques and methods can be used to find the roots of higher degree polynomial functions? • How will you analyze rational functions by finding all horizontal, vertical and slanted asymptotes and graphing them, both manually and using technology? • (Given a verbal description) How would you sketch a graph of this function?
<p><i>Unit 1: Enduring Understandings</i></p>	<p>Summarize, represent, and interpret data on a single count or measurement variable • Summarize, represent, and interpret data on two categorical and quantitative variables • Interpret linear models Perform arithmetic operations on polynomials • Understand the relationship between zeros and factors of polynomials • Use polynomial identities to solve problems • Rewrite rational expressions Build a function that models a relationship between two quantities • Build new functions from existing functions • Understand the concept of a function and use function notation • Interpret functions that arise in applications in terms of the context • Analyze functions using different representations • Construct and compare linear and exponential models and solve problems • Interpret expressions for functions in terms of the situation they model • Summarize, represent, and interpret data on a single count or measurement variable • Summarize, represent, and interpret data on two categorical and quantitative variables • Interpret linear models</p>		

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Curriculum Unit 1	Standards		Pacing	
			Days	Unit Days
Unit 1: Linear and Non-Linear Equations and Transformations	A.CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	5	45
	A.APR.B.3	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.		
	F.BF.B.5	Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.	25	
	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		
	F.LE.A.4	For exponential models, express as a logarithm of any base; evaluate the logarithm using technology		
	F.LE.4	For exponential models, express as a logarithm of any base; evaluate the logarithm using technology.		
	S.ID.B.6a	Fit a function to the data; use function fitted to data to solve problems in the context of the data. Use given function or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models	10	
	Assessment, Re-teach and Extension		5	

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Unit 1 Trig/PreCalc	
District/School Formative Assessment Plan	District/School Summative Assessment Plan
Pre-Assessment Quizzes, Tests Projects Exit Tickets Daily Monitoring	Unit Benchmark SAT Testing
Resources	Activities
<p>Textbooks:</p> <p>Blitzer, Algebra & Trigonometry, Pearson 6th Edition 2018</p> <ul style="list-style-type: none"> ➤ TI 84+ ➤ Smartboard Technology ➤ Desmos ➤ https://www.khanacademy.org/math/precalculus ➤ https://www.youtube.com/user/SullivanPrecalc9e/playlists ➤ https://www.ixl.com/math/trigonometry ➤ Diversity, Equity & Inclusion Educational Resources https://www.nj.gov/education/standards/dei/ 	<ul style="list-style-type: none"> • Students will understand the concept of a function and use function notation. Interpret functions that arise in applications in terms of the context. Analyze functions using different representations • Students will determine a function’s domain and range, relative maximums and relative minimums, and areas of increase/decrease/constant. • Students will determine if a function is even, odd, or neither. • Students will explore that if given a parent function and a transformed function, they will describe the transformation that occurred. Use these transformations to sketch a new graph or find new points • Students will understand the concept of a non-linear function and use function notation. Interpret non-linear functions that arise in applications in terms of the context and write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. • Students will learn how to add, subtract, multiply and divide functions as well as find composition of functions • Students will explore how to graph, write, solve, divide and apply polynomial functions of higher degree • Students will explore how to graph rational functions in any form, giving the domain of the function and labeling all asymptotes, holes, and intercepts • Students will understand that given the critical information about a rational function, determine an equation or a graph matching this information

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Instructional Best Practices and Exemplars	
1. Identifying similarities and differences 2. Summarizing and note taking 3. Reinforcing effort and providing recognition 4. Homework and practice 5. Nonlinguistic representations	6. Cooperative learning 7. Setting objectives and providing feedback 8. Generating and testing hypotheses 9. Cues, questions, and advance organizers 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	
<p>9.1.12.CP.9: Analyze the information contained in a credit report, how scores are calculated and used, and explain the importance of disputing inaccurate entries.</p> <p>9.1.12.CDM.6: Compute and assess the accumulating effect of interest paid over time when using a variety of sources of credit. (e.g., student loans, credit cards, auto loans, mortgages, etc.).</p> <p>9.2.12.CAP.4: Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.</p> <p>9.3.ST.2: Use technology to acquire, manipulate, analyze and report data.</p> <p>9.3.ST-ET.5: Apply the knowledge learned in STEM to solve problems.</p> <p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).</p> <p>9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).</p> <p>9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.</p> <p>9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments.</p> <p>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.</p> <p>Additional opportunities to address 9.1, 9.2 & 9.4:</p> <p>Philadelphia Mint https://www.usmint.gov/learn/kids/resources/educational-standards</p> <p>Different ways to teach Financial Literacy. https://www.makeuseof.com/tag/10-interactive-financial-websites-teach-kids-money-management-skills/</p>	

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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

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English Language Learners	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> <p><input type="checkbox"/> Grades 9-12 WIDA Can Do Descriptors:</p> <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 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 	<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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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.