Winslow Township School District
Trigonometry/PreCalculus
Unit 3 - Analytical Trigonometry and Sequences, Series, and Probability

Overview: In this unit, students will be able solve all types of trigonometric equations including: equations of quadratic type, ones involving multiple angles, others using sum and difference, multiple angle, power reducing, half angle, product to sum and sum to product formulas. Students will understand the use the Laws of Sine and Cosine to solve oblique triangles, find their areas while modeling and solving real life problems. Students will use the sequences and series to model real life problems. Students will be able to explore how to write the rule for a sequence, given a set of numbers or a sequence of images. Students will explore how to use sigma notation to describe a series and find the indicated partial sum or infinite sum. Students will discover how to use Binomial theorem to calculate the Binomial coefficients and then find the Binomial expansion using Pascal's triangles. Students will understand how to use combinations and permutation for counting problems. Students will be able to find probability of independent, dependent and mutually exclusive events

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Overview	Standards	Unit Focus	Essential Questions
Unit 3 **Analytical Trigonometry and Sequences, Series, and Probability**	F.TF.B.7 F.TF.C.9 G.SRT.D.9 G.SRT.D.10 G.SRT.D.11 F.BF.2 S.CP.5 WIDA 1,3	• Use the Law of Sines to solve oblique triangles • Find the area of an oblique triangle using Sine of an angle as well as Heron's Formula • Solve applied problems using the Law of Sines • Use the Law of Cosines to solve oblique triangles • Solve applied problems using the Law of Cosines • Use sum and difference and double and half angle formulas • Use all arithmetic and geometric sequence and sum formulas • Use sequences and series formulas to model real-life problems • Use all probability properties and formulas to include independent, dependent, and conditional probabilities	• How do you use fundamental trigonometric identities, sum and difference formulas and simplify and evaluate trigonometric functions and to verify trigonometric identities? • How do you use trigonometry and the Law of Sine and Law of Cosine to solve and find the areas of oblique triangles? • Show lottery tickets and look at the odds of winning. What decision would you make based on this information? • Show an odds chart concerning health insurance for smokers and non-smokers. Why is there a different cost for each?
Unit 3: Enduring Understandings	Extend the domain of trigonometric functions using the unit circle • Model periodic phenomena with trigonometric functions • Prove and apply trigonometric identities • Understand similarity in terms of similarity transformations • Prove theorems involving similarity • Define trigonometric ratios and solve problems involving right triangles • Apply trigonometry to general triangles • Build a function that models a relationship between two quantities • Build new functions from existing functions • Understand independence and conditional probability and use them to interpret data • Use the rules of probability to compute probabilities of compound events in a uniform probability model		• What methods can be used to find binomial coefficients? • How do you use binomial coefficients to write binomial expansions?

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Curriculum Unit 3	Standards		Pacing	
			Days	Unit Days
Unit 3: **Analytical Trigonometry and Sequences, Series, and Probability**	F.TF.B.7	Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.	10	45
	F.TF.C.9	Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.		
	G.SRT.D.9	Derive the formulas $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	20	
	G.SRT.D.10	Prove the Laws of Sines and Cosines and use them to solve problems.		
	G.SRT.D.11	Understand and apply the law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g. surveying problems, resultant forces).		
	F.BF.2	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	5	
	S.CP.5	Use everyday language to explain independence and conditional probability in real-world situations.	5	
	Assessment, Re-teach and Extension		5	

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Unit 3 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**
Textbook: Blitzer, Algebra & Trigonometry, Pearson 6th Edition 2018 ➢ 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/	• Students will be able solve all types of trigonometric equations including: equations of quadratic type, ones involving multiple angles, others using sum and difference, multiple angle, power reducing, half angle, product to sum and sum to product formulas. • Students will understand the use the law of Sine and Cosine to solve oblique triangles, find their areas while modeling and solving real life problems • Students will use the sequences and series to model real life problems. • Students will be able to explore how to write the rule for a sequence, given a set of numbers or a sequence of images • Students will explore how to use sigma notation to describe a series and find the indicated partial sum or infinite sum • Students will discover how to use Binomial theorem to calculate the Binomial coefficients and then find the Binomial expansion using Pascal's triangles • Students will understand how to use combinations and permutation for counting problems. • Students will be able to find probability of independent, dependent and mutually exclusive events

Trig/PreCalc – Unit 3   4

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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/

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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

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

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.