

Winslow Township School District
Trigonometry/PreCalculus
Unit 4 - Vectors, Analytical Geometry, Limits, and Introduction to Calculus

Overview: In this unit, students will be able to find component forms of unit vectors in same direction of magnitude of dot product of and system.

Students will be able to determine whether vectors are parallel and apply them to solve real life problems. They will be able to convert between rectangular coordinates and equations into polar coordinates and equations as well as graph points and equations in the polar coordinate system. Students will be able to understand how to use matrices and perform matrix operations. They will understand the concept of a limit and use the definition, factoring and rationalizing techniques to find the limits of the functions graphically and algebraically. Students will evaluate limits of difference quotients from Calculus. Students will understand the definition of derivative and rates of change to begin to solve problems using Calculus.

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Overview	Standards	Unit Focus	Essential Questions
<p>Unit 4</p> <p>Vectors, Analytical Geometry, Limits, and Introduction to Calculus</p>	<p>F.IF.A.3 F.IF.B.4 F.LE.A.1b F.LE.A.1c WIDA 1,3</p>	<ul style="list-style-type: none"> • Vectors • Vector Operations • Polar and Rectangular Forms • Matrices • Matrix Operations • Introduction to Limits • Infinite Limit Rules • Introduction to Derivatives 	<ul style="list-style-type: none"> • How are vectors, parametric equations, and polar coordinates useful in solving real-world problems? • How are functions represented using vectors, parametric equations, and polar coordinates? • What is the limit of a function and how can a limit be used to determine the continuity of a function? • What is the difference between average and infinitesimal changes and how does that relate to tangent lines?
<p><i>Unit 4: Enduring Understandings</i></p>	<p>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</p>		<ul style="list-style-type: none"> • How do you calculate the slope of a curve at a point and express it in terms of a limit? • Why do we need derivatives?

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Curriculum Unit 4	Standards		Pacing	
			Days	Unit Days
Unit 4: Vectors, Analytical Geometry, Limits, and Introduction to Calculus	F.IF.A.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.	22	45
	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. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. * Find the limits of functions either by using its definition, by approximating it graphically and numerically or by evaluating one-sided ones		
	F.LE.A.1b	Recognize situations in which one quantity changes at a constant rate per unit interval relative to another	18	
	F.LE.A.1c	Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. * Use a tangent line to approximate the slope of a graph at a point.		
	Assessment, Re-teach and Extension			

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Unit 4 Trig/PreCalc

District/School Formative Assessment Plan	District/School Summative Assessment Plan
Pre-Assessment Quizzes, Tests Exit Tickets Daily Monitoring	Unit Benchmark SAT Testing
Resources	Activities
<p>Textbook:</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 <p>➤ Diversity, Equity & Inclusion Educational Resources https://www.nj.gov/education/standards/dei/</p>	<ul style="list-style-type: none"> • Students will explore how to plot points, find distance between and mid points in a 3D coordinate • Students will be able to find component forms of unit vectors in same direction of magnitude of dot product of and system. • Students will be able to determine whether vectors are parallel and apply them to solve real life problems. • Students will convert between rectangular coordinates and equations into polar coordinates and equations. • Students will graph points and equations in the polar coordinate system • Students will understand the concept of limit and use the definition, factoring and rationalizing techniques to find the limits of the functions graphically and algebraically. • Students will evaluate limits of difference quotients from Calculus • Students will use the definition of Derivative to solve for instantaneous rates of change

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Instructional Best Practices and Exemplars

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|---|--|
| 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

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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

NJLSA.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.

NJLSA.SL2 Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

NJLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

NJLSA.R10. Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.

NJLSA.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.