

Pre-Calculus Math Curriculum



Egg Harbor Township School District

State Board Adoption Date of Standards: 5/2016

Unit Overview (Standards Coverage)

Unit	Standards	Unit Focus	Standards for Mathematical Practice	Open Educational Resources
Unit 1 <i>Functions and Their Graphs 20 Days</i>	To determine and work with functions and their graphs.	What are the characteristics of functions and their graphs.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others.	<ul style="list-style-type: none"> ● www.mathxforschool.com ● www.khanacademy.com ● www.desmos.com ● www.kahoot.com ● www.quizizz.com
Unit 2 <i>Polynomial and Rational Functions 30 Days</i>	To work with polynomials, rational functions and complex numbers.	What are the characteristics of polynomial and rational functions	MP.4 Model with mathematics. MP.5 Use appropriate tools strategically.	<ul style="list-style-type: none"> ● www.mathxforschool.com ● www.khanacademy.com ● www.desmos.com ● www.kahoot.com ● www.quizizz.com
Unit 3 <i>Exponential and Logarithmic Functions 25 Days</i>	To work with exponential and logarithmic functions.	What are the characteristics of exponential and logarithmic functions.	MP.6 Attend to precision. MP.7 Look for and make use of structure.	<ul style="list-style-type: none"> ● www.mathxforschool.com ● www.khanacademy.com ● www.desmos.com ● www.kahoot.com ● www.quizizz.com
Unit 4 <i>Trigonometry 70 Days</i>	To work with degree and radian measure and graph and evaluate trigonometric functions.	What are the characteristics of trigonometric functions.	MP.8 Look for and express regularity in repeated reasoning	<ul style="list-style-type: none"> ● www.mathxforschool.com ● www.khanacademy.com ● www.desmos.com ● www.kahoot.com ● www.quizizz.com

This document outlines in detail the answers to following four questions:

1. What do we want our students to know?
2. How do we know if they learned it?
3. What do we do if they did not learn it?
4. What do we do when they did learn it?

Unit 1 PRE-CALCULUS		
Content & Practice Standards	Interdisciplinary Standards	Critical Knowledge & Skills
<ul style="list-style-type: none"> ● To find the slope of a line and use it to write and equation of the line then graph. ● To define a function and find the domain and range. ● To determine the key elements of a function. ● To write and graph simple transformations of functions. ● To combine two functions to form a new function. ● To find the inverse of a function and how to represent it graphically and algebraically. 	<ul style="list-style-type: none"> ● TECHNOLOGY STANDARDS and APPLY explicit standards as appropriate. ● ● 8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in ● order to solve problems individually and collaborate and to create and communicate knowledge. ● o A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, ● systems and operations ● o B. Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative ● products and process using technology. ● o E: Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information. ● o F: Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct ● research, manage projects, solve problems, and make informed decisions using appropriate digital tools and ● resources. ● 21st Century Themes/Careers: Through instruction in life and career skills, all students acquire the knowledge and skills ● needed to prepare for life as citizens and workers in the 21st century. For further clarification see NJ World Class Standards ● at www.NJ.gov/education/aps/cccs/career/ ● CRP2. Apply appropriate academic and technical skills. ● CRP4. Communicate clearly and effectively and with reason. 	<p>Students will find slopes of lines and write equations of lines. Students are introduced to functions and learn to identify, categorize, and describe functions. To graph functions and represent simple transformations. To work with the composition of more than one function and the inverse of a function.</p>

Curricular Framework MATH-Pre-Calculus

	<ul style="list-style-type: none"> ● CRP6. Demonstrate creativity and innovation. ● CRP7. Employ valid and reliable research strategies. ● CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. ● CRP11. Use technology to enhance productivity. ● 9.2 Career Awareness, Exploration, and Preparation- This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements. ● Evidence 	
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Unit 1 PRE-CALCULUS

Stage 1 – Desired Results

UNIT SUMMARY	CORE AND SUPPLEMENTAL MATERIALS/RESOURCES
<p><i>Unit 1: Functions and Their Graphs addresses functions and their representations in the Cartesian plane. Students will be able to use functions and model real-world data.</i></p>	<ul style="list-style-type: none"> ● Textbook ● Graphing Calculator ● Computer software to support unit. ● Smart board ● Document camera

UNDERSTANDINGS

<p>Students will understand that...</p> <ul style="list-style-type: none"> ● How to graph functions. ● How to transform functions. ● How to build functions from functions. ● How to find an inverse function graphically and algebraically. ● How to model real-life problems in a variety of content areas with functions.

Students will know...	Students will be able to...
<p><i>Functions and Their Graphs.</i></p>	<p><i>Determine the domain and range of a function graphically, algebraically and numerically.</i></p>

Stage 2 – Assessment Evidence

<p>Performance Tasks: Teacher-made tests, worksheets, warm-ups, and quizzes.</p>	<p>Other Evidence: Computer software to support the unit <u>Formative</u></p>
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Performance Tasks/Use of Technology

- www.mathxlforschool.com
- www.khanacademy.com
- www.desmos.com
- www.kahoot.com
- www.quizizz.com

- Teacher observation
- Exit slips/check for understanding
- Games
- Oral Assessments/conferencing
- Portfolio/math journal
- Daily Classwork
- Pre-Assessment
- Fluency Check
- Quick Quiz
- Student Activity Pages

Summative

- Quick Quiz
- Performance Task
- Unit Test
- Benchmark Assessment
- Alternative Assessments

Stage 3 – Learning Plan

• *Unit 1 addresses functions and their representations in the Cartesian plane. Students begin the unit by finding the slopes of lines and writing equations of lines. Next, students are introduced to functions and learn to identify, categorize, and describe functions. They then learn to graph functions and represent simple transformations of the six most commonly used functions in algebra. The chapter concludes by investigating the composition of more than one function, the inverse of a function, and the use of functions in modeling real-world data.*

Planned Differentiation & Interventions for Tiers I, II, III, ELL, SPED, and Gift & Talented Students

- *Rethink and revise. Dig deeper into ideas at issue (through the faces of understanding). Revise, rehearse, and refine, as needed. Guide students in self-assessment and self-adjustment, based on feedback from inquiry, results, and discussion.*
- *Evaluate understandings. Reveal what has been understood through final performances and products. Involve students in a final self-assessment to identify remaining questions, set future goals, and point toward new units and lessons.*
- *Tailor (personalize) the work to ensure maximum interest and achievement. Differentiate the approaches used and provide sufficient options and variety (without compromising goals) to make it most likely that all students will be engaged and effective.*

Gifted & Talented:

- “Differentiating the Lesson” in Big Ideas online resources for all sections
- “Additional Topics” in Big Ideas online resources to extend and enhance instruction

- Big Ideas Game Closet
- Big Ideas Differentiated Instruction options
- Big Ideas Mini-Assessments
- Design Challenges
- Student Choice/Driven Activities
- Group Projects
- MobyMax
- LinkIt!
- Rocket Math
- [Intervention Central](#)
- [Do to Learn](#)
- [Differentiation Strategies for Math](#)
- [Discovery Education Math](#)
- [Everyday Mathematics](#)
- [Homework Spot](#)
- [Math Fact Fluency](#)

Tier I:

- “Differentiating the Lesson” in Big Ideas online resources for all sections
- Big Ideas MATH Pyramid of Tiered Interventions for additional resources
- Record and Practice Journal
- Differentiated Instruction options
- Fair Game Review
- Vocabulary Support Glossary resources
- Mini-Assessments
- Game Closet
- Lesson Tutorials
- Flash Cards
- Extended Time
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Math Tutoring Center (HS only)
- Math Lab/Tutorial
- MobyMax
- LinkIt!
- Rocket Math

- [Intervention Central](#)
- [Do to Learn](#)
- [Learning Ally](#)
- [Differentiation Strategies for Math](#)
- [Discovery Education Math](#)
- [Everyday Mathematics](#)
- [Homework Spot](#)
- [Flash Card Math](#)
- [Math Fact Fluency](#)

Tier II:

- Lesson Tutorials
- Basic Skills Handbook
- Skills Review Handbook
- Differentiated Instruction Big Ideas resources
- Game Closet
- Centers/Small Group Instruction
- Math Tutoring Center (HS only)
- Math Lab/Tutorial
- MobyMax
- LinkIt!
- Math Fact Fluency/Rocket Math

Tier III:

- Customized Learning Intervention Activities resources
- Intensive Intervention resource
- Systematic Assessments to focus on specific deficits

ELL:

- Big Ideas Math Student Editions are available online in Spanish
- Letters to Parents are available in the Resources by Chapter book to assist in guiding parents through each chapter and offer helpful suggestions they can use to demonstrate mathematical concepts for their child in daily activities. These letters are editable so teachers can customize them.
- Student Dynamic eBook Audio has the option to be read in English or Spanish
- Multi-Language Glossary for new Math vocabulary is available in 14 different languages.
- Audio version is available in English or Spanish.
- Game Closet can be accessed in English or Spanish, while also allowing for all students to play and understand these educational games.
- ELL Notes included in Teacher Edition to help teachers overcome obstacles.
- Record & Practice Journal available in Spanish.

- Student Journal available in Spanish.
- Chapter Reviews available in English and Spanish.
- Vocabulary Flash Cards
- Chunking Information
- Math Word Wall/Word Bank
- Multi-Sensory Instruction
- Use of Translation software
- Gradual Release Model
- [TODOS: Mathematics for ALL](#) - Excellence and Equity in Mathematics
- [FABRIC - A Learning Paradigm for ELLs](#) (NJDOE resource)

SPED:

- Menu Math (mostly for very low functioning students)
- Math Labs/Tutorial
- MobyMax
- LinkIt!
- IXL
- Learning Ally (audio version for textbooks and other published materials) – Also available for 504 students
- Apex Online Learning – Bridge students only
- Use of specialized equipment such as beeping balls, text to speech and speech to text software, special seats or desks
- Use of hands-on materials for problem solving
- Visual supports and Use of Manipulatives
- Extended time to complete tests and assignments
- Graphic Organizers/Study Guides
- Mnemonic tricks to improve memory
- Reducing workload
- Centers/Small Group Instruction
- Adjusting accountability for standards by focusing only on essential standards
- Use of iPads or laptops for students with motor issues that make writing difficult
- Use of tangible rewards (certificates, small toys, etc. per behavior plan)
- Use prompts and model directions
- Use task analysis to break down activities and lessons into each individual step needed to complete the task
- Use concrete examples to teach concepts
- Have student repeat/rephrase written directions
- Provide multi-sensory, hands-on materials for instruction
- Chunking Information
- Modify all fine motor tasks for example: (fat crayons, pencil grip, adaptive scissors)
- Functional or practical emphasis

504:

- Learning Ally (audio version for textbooks and other published materials)
- Extra help opportunities
- Reduce workload
- Partial credit
- Allow use of calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed (use interactive notebook)
- Preferential Seating
- Extra Practice
- Directions repeated, clarified and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives

Unit 2 PRE-CALCULUS		
Content & Practice Standards	Interdisciplinary Standards	Critical Knowledge & Skills
<ul style="list-style-type: none"> ● To graph quadratic functions. ● To graph polynomial functions of higher degree. ● To find all zeros of a polynomial function. ● To perform operations with complex numbers. ● To find the domain and asymptotes of a rational function. ● To graph rational functions. 	<ul style="list-style-type: none"> ● TECHNOLOGY STANDARDS and APPLY explicit standards as appropriate. ● ● 8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge. ● o A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, ● systems and operations ● o B. Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative ● products and process using technology. ● o E: Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information. ● o F: Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct ● research, manage projects, solve problems, and make informed decisions using appropriate digital tools and ● resources. ● 21st Century Themes/Careers: Through instruction in life and career skills, all students acquire the knowledge and skills ● needed to prepare for life as citizens and workers in the 21st century. For further clarification see NJ World Class Standards ● at www.NJ.gov/education/aps/cccs/career/ ● CRP2. Apply appropriate academic and technical skills. ● CRP4. Communicate clearly and effectively and with reason. 	<p>Students learn to analyze and graph polynomial and rational functions. They begin with identifying key characteristics and creating graphs of quadratic and other polynomial functions. They will use polynomial division to find both real and complex roots. They will find asymptotes, intercepts, and holes to graph a rational function.</p>

Curricular Framework MATH-Pre-Calculus

	<ul style="list-style-type: none"> ● CRP6. Demonstrate creativity and innovation. ● CRP7. Employ valid and reliable research strategies. ● CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. ● CRP11. Use technology to enhance productivity. ● 9.2 Career Awareness, Exploration, and Preparation- This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements. ● Evidence 	
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Unit 2 PRE-CALCULUS

Stage 1 – Desired Results

UNIT SUMMARY	CORE AND SUPPLEMENTAL MATERIALS/RESOURCES
<i>Unit 2: Polynomial and Rational Functions. To address analyzing and graphing polynomial and rational functions.</i>	<ul style="list-style-type: none"> ● Textbook ● Graphing Calculator ● Computer software to support unit. ● Smart board ● Document camera

UNDERSTANDINGS

<p>Students will understand that...</p> <ul style="list-style-type: none"> ● How to sketch graphs and write equations of parabolas. ● How to sketch the graph of a polynomial function. ● How to divide a polynomial by another polynomial and use polynomial division to find the rational and real zeros of polynomials. ● How to perform operations with complex numbers. ● How to find all the zeros, real and imaginary of a polynomial function. ● How to find the domain and asymptotes of a rational function. ● How to sketch the graph of a rational function.

Students will know...	Students will be able to...
<i>Polynomial and Rational Functions.</i>	<i>Graph polynomial functions and find asymptotes, intercepts and holes as they graph rational functions.</i>

Stage 2 – Assessment Evidence

Performance Tasks:

Performance Tasks/Use of Technology

- www.mathx1forschool.com
- www.khanacademy.com
- www.desmos.com
- www.kahoot.com
- www.quizizz.com

Other Evidence:

Formative

- [Teacher observation](#)
- [Exit slips/check for understanding](#)
- [Games](#)
- [Oral Assessments/conferencing](#)
- [Portfolio/math journal](#)
- [Daily Classwork](#)
- [Pre-Assessment](#)
- [Fluency Check](#)
- [Quick Quiz](#)
- [Student Activity Pages](#)
- [Teacher observation](#)
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- [Student Activity Pages](#)

Summative

- [Quick Quiz](#)
- [Performance Task](#)
- [Unit Test](#)
- [Benchmark Assessment](#)
- [Alternative Assessments](#)

Stage 3 – Learning Plan

• *In Unit 2 students will analyze and graph polynomial and rational functions. The unit begins with identifying key characteristics and creating graphs of quadratic and other functions. Then learn to use polynomial division to find both real and complex roots. Students will also learn how to find asymptotes, intercepts, and holes as they graph rational functions.*

Planned Differentiation & Interventions for Tiers I, II, III, ELL, SPED, and Gift & Talented Students

- *Rethink and revise. Dig deeper into ideas at issue (through the faces of understanding). Revise, rehearse, and refine, as needed. Guide students in self-assessment and self-adjustment, based on feedback from inquiry, results, and discussion.*
- *Evaluate understandings. Reveal what has been understood through final performances and products. Involve students in a final self-assessment to identify remaining questions, set future goals, and point toward new units and lessons.*
- *Tailor (personalize) the work to ensure maximum interest and achievement. Differentiate the approaches used and provide sufficient options and variety (without compromising goals) to make it most likely that all students will be engaged and effective.*

Gifted & Talented:

- “Differentiating the Lesson” in Big Ideas online resources for all sections
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- Big Ideas Game Closet
- Big Ideas Differentiated Instruction options
- Big Ideas Mini-Assessments
- Design Challenges
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- Group Projects
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- LinkIt!
- Rocket Math
- [Intervention Central](#)
- [Do to Learn](#)
- [Differentiation Strategies for Math](#)
- [Discovery Education Math](#)
- [Everyday Mathematics](#)
- [Homework Spot](#)
- [Math Fact Fluency](#)

Tier I:

- “Differentiating the Lesson” in Big Ideas online resources for all sections
- Big Ideas MATH Pyramid of Tiered Interventions for additional resources
- Record and Practice Journal
- Differentiated Instruction options
- Fair Game Review
- Vocabulary Support Glossary resources

- Mini-Assessments
- Game Closet
- Lesson Tutorials
- Flash Cards
- Extended Time
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
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- Skills Review Handbook
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- Visual supports and Use of Manipulatives
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- Mnemonic tricks to improve memory
- Reducing workload
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- Adjusting accountability for standards by focusing only on essential standards
- Use of iPads or laptops for students with motor issues that make writing difficult
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- Partial credit
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- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed (use interactive notebook)
- Preferential Seating
- Extra Practice
- Directions repeated, clarified and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives

Unit 3 PRE-CALCULUS		
Content & Practice Standards	Interdisciplinary Standards	Critical Knowledge & Skills
<ul style="list-style-type: none"> ● To recognize, evaluate and graph exponential functions. ● To use properties of logarithms to simplify and/or evaluate. ● To solve exponential and logarithmic equations. ● To use exponents and logarithms to model a variety of situations. 	<ul style="list-style-type: none"> ● TECHNOLOGY STANDARDS and APPLY explicit standards as appropriate. ● ● 8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in <ul style="list-style-type: none"> ● order to solve problems individually and collaborate and to create and communicate knowledge. ● o A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, <ul style="list-style-type: none"> ● systems and operations ● o B. Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative <ul style="list-style-type: none"> ● products and process using technology. ● o E: Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information. ● o F: Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct <ul style="list-style-type: none"> ● research, manage projects, solve problems, and make informed decisions using appropriate digital tools and <ul style="list-style-type: none"> ● resources. ● 21st Century Themes/Careers: Through instruction in life and career skills, all students acquire the knowledge and skills <ul style="list-style-type: none"> ● needed to prepare for life as citizens and workers in the 21st century. For further clarification see NJ World Class Standards <ul style="list-style-type: none"> ● at www.NJ.gov/education/aps/cccs/career/ ● CRP2. Apply appropriate academic and technical skills. ● CRP4. Communicate clearly and effectively and with reason. 	<p>Students will work with exponential and logarithmic functions. They begin by writing, graphing, and recognizing the basic characteristics of exponential and logarithmic functions. Students learn how to use these functions to model real-world problems including compound interest, radioactive decay, and human memory. They then expand their skills by using the properties of logarithms and exponents to manipulate expressions and solve equations.</p>

Curricular Framework MATH-Pre-Calculus

	<ul style="list-style-type: none"> ● CRP6. Demonstrate creativity and innovation. ● CRP7. Employ valid and reliable research strategies. ● CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. ● CRP11. Use technology to enhance productivity. ● 9.2 Career Awareness, Exploration, and Preparation- This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements. ● Evidence 	
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Unit 3 PRE-CALCULUS

Stage 1 – Desired Results

UNIT SUMMARY	CORE AND SUPPLEMENTAL MATERIALS/RESOURCES
<i>Unit 3: Students will work with exponential and logarithmic functions.</i>	<ul style="list-style-type: none"> ● Textbook ● Graphing Calculator ● Computer software to support unit. ● Smart board ● Document camera

UNDERSTANDINGS

<p>Students will understand that...</p> <ul style="list-style-type: none"> ● How to write and graph exponential functions. ● How to recognize, evaluate, and graph logarithmic functions. ● How to rewrite logarithmic expressions to simplify and evaluate them. ● How to solve exponential and logarithmic equations. ● How to use exponents and logarithms to model a variety of situations.
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Students will know...	Students will be able to...
<i>Exponential and Logarithmic functions.</i>	<i>Graph, recognize and solve characteristics of exponential and logarithmic functions.</i>

Stage 2 – Assessment Evidence

Performance Tasks:	Other Evidence:
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Curricular Framework MATH-Pre-Calculus

Performance Tasks/Use of Technology

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Formative

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- Exit slips/check for understanding
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- Portfolio/math journal
- Daily Classwork
- Pre-Assessment
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- Pre-Assessment
- Fluency Check
- Quick Quiz
- Student Activity Pages

Summative

- Quick Quiz
- Performance Task
- Unit Test
- Benchmark Assessment
- Alternative Assessments

Stage 3 – Learning Plan

• *In Unit 3 students will work with exponential and logarithmic functions. They will begin by writing, graphing, and recognizing the basic characteristics of exponential and logarithmic functions. Students will learn how to use these functions to model real-world problems including compound interest, radioactive decay, and human memory. Then they expand their skills by using the properties of logarithms and exponents to manipulate expressions and solve equations. Finally, students learn five exponential and logarithmic models which they then use to solve real-world problems from a variety of contexts.*

Planned Differentiation & Interventions for Tiers I, II, III, ELL, SPED, and Gift & Talented Students

- *Rethink and revise. Dig deeper into ideas at issue (through the faces of understanding). Revise, rehearse, and refine, as needed. Guide students in self-assessment and self-adjustment, based on feedback from inquiry, results, and discussion.*
- *Evaluate understandings. Reveal what has been understood through final performances and products. Involve students in a final self-assessment to identify remaining questions, set future goals, and point toward new units and lessons.*
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Gifted & Talented:

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- [Math Fact Fluency](#)

Tier II:

- Lesson Tutorials
- Basic Skills Handbook
- Skills Review Handbook
- Differentiated Instruction Big Ideas resources
- Game Closet
- Centers/Small Group Instruction
- Math Tutoring Center (HS only)
- Math Lab/Tutorial
- MobyMax
- LinkIt!
- Math Fact Fluency/Rocket Math

Tier III:

- Customized Learning Intervention Activities resources
- Intensive Intervention resource
- Systematic Assessments to focus on specific deficits

ELL:

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- Math Word Wall/Word Bank
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SPED:

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- MobyMax
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- Graphic Organizers/Study Guides
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- Reducing workload
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- Adjusting accountability for standards by focusing only on essential standards
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- Use of tangible rewards (certificates, small toys, etc. per behavior plan)
- Use prompts and model directions
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- Use concrete examples to teach concepts
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- Provide multi-sensory, hands-on materials for instruction
- Chunking Information
- Modify all fine motor tasks for example: (fat crayons, pencil grip, adaptive scissors)
- Functional or practical emphasis

504:

- Learning Ally (audio version for textbooks and other published materials)
- Extra help opportunities
- Reduce workload
- Partial credit
- Allow use of calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed (use interactive notebook)
- Preferential Seating
- Extra Practice
- Directions repeated, clarified and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives

Unit 4 PRE-CALCULUS		
Content & Practice Standards	Interdisciplinary Standards	Critical Knowledge & Skills
<ul style="list-style-type: none"> ● To describe angles and angular movement. ● To convert from radian to degree measure and vice versa. ● To derive the unit circle. ● To use trigonometry to find unknown side lengths and angles in right triangles. ● To evaluate trigonometric functions of any angle. ● To graph the six trigonometric functions and transform them. ● To evaluate and graph the inverses of trigonometric functions. ● To simplify, verify and solve trigonometric equations. ● To simplify and solve equations that contain sums or differences of angles. ● To rewrite trigonometric expressions that contain functions of multiple or half-angles, or functions that involve squares of products of trigonometric expressions. ● To use trigonometry to solve and find the areas of oblique triangles. 	<ul style="list-style-type: none"> ● TECHNOLOGY STANDARDS and APPLY explicit standards as appropriate. ● ● 8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in <ul style="list-style-type: none"> ● order to solve problems individually and collaborate and to create and communicate knowledge. ● o A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, <ul style="list-style-type: none"> ● systems and operations ● o B. Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative <ul style="list-style-type: none"> ● products and process using technology. ● o E: Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information. ● o F: Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct <ul style="list-style-type: none"> ● research, manage projects, solve problems, and make informed decisions using appropriate digital tools and <ul style="list-style-type: none"> ● resources. ● 21st Century Themes/Careers: Through instruction in life and career skills, all students acquire the knowledge and skills <ul style="list-style-type: none"> ● needed to prepare for life as citizens and workers in the 21st century. For further clarification see NJ World Class Standards <ul style="list-style-type: none"> ● at www.NJ.gov/education/aps/cccs/career/ ● CRP2. Apply appropriate academic and technical skills. ● CRP4. Communicate clearly and effectively and with reason. 	<p>Students learn how to evaluate and graph the trigonometric functions and their inverses and reciprocals. To change from degree and radian measure and derive the unit circle. To graph trigonometric functions and to identify the basic characteristics of the trigonometric functions, their reciprocals and their inverses. Students will use trigonometric ratios to solve problems in a variety of contexts, such as mechanics, biology and navigation.</p> <p>Students will use trigonometric identities to simplify, verify and solve equations.</p>

Curricular Framework MATH-Pre-Calculus

	<ul style="list-style-type: none"> ● CRP6. Demonstrate creativity and innovation. ● CRP7. Employ valid and reliable research strategies. ● CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. ● CRP11. Use technology to enhance productivity. ● 9.2 Career Awareness, Exploration, and Preparation- This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements. ● Evidence 	
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Unit 4 PRE-CALCULUS

Stage 1 – Desired Results

UNIT SUMMARY	CORE AND SUPPLEMENTAL MATERIALS/RESOURCES
<p><i>Unit 4: Students will work with trigonometric functions and analytic trigonometry.</i></p>	<ul style="list-style-type: none"> ● Textbook ● Graphing Calculator ● Computer software to support unit. ● Smart board ● Document camera

UNDERSTANDINGS

<p>Students will understand that...</p> <ul style="list-style-type: none"> ● How to describe angles and angular movement. ● How to evaluate trigonometric functions by using the unit circle. ● How to use trigonometry to find unknown side lengths and angles in right triangles. ● How to evaluate trigonometric functions of any right angle. ● How to sketch the graphs of six trigonometric functions. ● How to evaluate and graph the inverses of trigonometric functions. ● How to use trigonometric functions to solve real-life problems. ● How to simplify and verify trigonometric functions. ● How to solve trigonometric equations using formulas and identities.
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Students will know...	Students will be able to...
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Trigonometric functions, graphs, and identities.	Graph trigonometric functions, and to use functions and identities to simplify and solve trigonometric equations.
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Stage 2 – Assessment Evidence

Performance Tasks:

Performance Tasks/Use of Technology

- www.mathxlforschool.com
- www.khanacademy.com
- www.desmos.com
- www.kahoot.com
- www.quizizz.com

What projects, hands-on lessons, use of manipulatives, active participation in new situations, etc. will reveal evidence of meaning-making and transfer (true understanding)?

Performance Tasks/Use of Technology

-

Other Evidence:

Formative

- Teacher observation
- Exit slips/check for understanding
- Games
- Oral Assessments/conferencing
- Portfolio/math journal
- Daily Classwork
- Pre-Assessment
- Fluency Check
- Quick Quiz
- Student Activity Pages
- Teacher observation
- Exit slips/check for understanding
- Games
- Oral Assessments/conferencing
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- Daily Classwork
- Pre-Assessment
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-

Summative

- Quick Quiz
- Performance Task
- Unit Test
- Benchmark Assessment
- Alternative Assessments

Stage 3 – Learning Plan

• Unit 4 students learn how to evaluate and graph trigonometric functions, their inverses, and their reciprocals. the unit begins by introducing radian measure and the definitions of trigonometric functions on the unit circle. Students then learn how to find trigonometric ratios of an acute angle by

drawing a unit circle and a reference angle. They also learn how to graph trigonometric functions and to identify the basic characteristics of trigonometric functions, their reciprocals, and their inverses. Students will learn strategies for simplifying expressions and solving equations by using trigonometric identities. They will study equations containing sums and differences of angles. Students will learn how to rewrite trigonometric expressions that contain functions of multiple or half-angles and that involve squares or products of trigonometric functions. Finally, students will learn how to apply trigonometry to oblique triangles, vectors and complex numbers. Students will also use trigonometric ratios to solve problems in a variety of contexts, such as mechanics, biology, and navigation.

Planned Differentiation & Interventions for Tiers I, II, III, ELL, SPED, and Gift & Talented Students

- *Rethink and revise. Dig deeper into ideas at issue (through the faces of understanding). Revise, rehearse, and refine, as needed. Guide students in self-assessment and self-adjustment, based on feedback from inquiry, results, and discussion.*
- *Evaluate understandings. Reveal what has been understood through final performances and products. Involve students in a final self-assessment to identify remaining questions, set future goals, and point toward new units and lessons.*
- *Tailor (personalize) the work to ensure maximum interest and achievement. Differentiate the approaches used and provide sufficient options and variety (without compromising goals) to make it most likely that all students will be engaged and effective.*

Gifted & Talented:

- “Differentiating the Lesson” in Big Ideas online resources for all sections
- “Additional Topics” in Big Ideas online resources to extend and enhance instruction
- Big Ideas Game Closet
- Big Ideas Differentiated Instruction options
- Big Ideas Mini-Assessments
- Design Challenges
- Student Choice/Driven Activities
- Group Projects
- MobyMax
- LinkIt!
- Rocket Math
- [Intervention Central](#)
- [Do to Learn](#)
- [Differentiation Strategies for Math](#)
- [Discovery Education Math](#)
- [Everyday Mathematics](#)
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Tier I:

- “Differentiating the Lesson” in Big Ideas online resources for all sections
- Big Ideas MATH Pyramid of Tiered Interventions for additional resources
- Record and Practice Journal
- Differentiated Instruction options
- Fair Game Review
- Vocabulary Support Glossary resources
- Mini-Assessments
- Game Closet
- Lesson Tutorials
- Flash Cards
- Extended Time
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
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