DEPARTMENT <u>Mathematics</u>   COURSE <u>Pre-Calculus</u>

Curriculum Development Timeline

School: Ocean Township High School

Course: Pre-Calculus

Department: Mathematics

Board Approval	Supervisor	Notes
July 2012	Janet Bluefield	Born Date
August 2017	Nichole Kerney	Revisions
August 2019	Nichole Kerney	Revisions
August 2022	Gerard Marrone	Alignment to Standards

* Topic completed in Advanced/Honors; in regular level differentiate topics and include if time permits.

** Topic is completed in only Honors.

Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

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Township of Ocean Pacing Guide			
Week	Marking Period 1	**Week**	Marking Period 3
1	Functions and Operations with Functions	11	Trigonometry (Triangles, Angles, Unit Circle)
2	Functions and Operations with Functions	12	Trigonometry (Triangles, Angles, Unit Circle)
3	Functions and Operations with Functions	13	Trigonometry (Triangles, Angles, Unit Circle)
4	Functions and Operations with Functions	14	Trigonometric Graphs
5	Polynomial & Rational Functions	15	Trigonometric Graphs
Week	Marking Period 2	**Week**	Marking Period 4
6	Polynomial & Rational Functions	16	Analytic Trigonometry
7	Polynomial & Rational Functions	17	Analytic Trigonometry
8	Polynomial & Rational Functions	18	Polar Coordinates and Functions** and Vectors*
9	Exponential & Logarithmic Functions	19	Introduction to Limits and Continuity*
10	Exponential & Logarithmic Functions	20	Introduction to Limits and Continuity*

Core Instructional & Supplemental Materials including various levels of Texts
Core Instruction: Precalculus- Pearson Supplemental: IXL Math & Kuta Software Special Education and ELL Supplemental: Purplemath.com for more basic topics

Time Frame	**4 weeks (20 blocks)**

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DEPARTMENT <u>Mathematics</u>   COURSE <u>Pre-Calculus</u>

Topic
Functions and Operations of Functions (Purple Ch2all, 5.1-5.2)
Alignment to Standards
<u>F.IF.1, F.IF.4, F.IF.7b, F.BF.3, A.APR.6</u>
Learning Objectives and Activities

SWBAT answer the following questions:
- How are functions and their graphs related?
- How can technology be used to investigate properties of families of functions and their graphs?
- How does explaining a process help me to better understand the idea?
- What are some patterns in the manipulation or changes in function?

SWBAT demonstrate understanding of the following:
- Graphs and equations are alternative ways for depicting and analyzing patterns of non-linear change.
- Mathematical models can be used to describe physical relationships; these are often non-linear.
- Creating a graph is not the same as interpreting the information displayed.
- A variety of families of functions and methods can be used to model and solve real world situations.
- Function families have common characteristics.
- We can use Algebra to help graph functions.
- Technology is a resource for discoveries and investigations.
- There is a difference between using technology to find the answer compared to using technology to aid in supporting the answer.

Learning Activities:
- Determine if a relationship represents a function and values of such.
- *Find the difference quotient by substituting (x+h) into the equation. REMIND THEM THAT THIS WILL COME BACK IN THE LAST UNIT OF STUDY
- Determine the inverse of a function and find the domain.
- Determine 1-1 functions.
- Determine whether a function is odd, even or neither – algebraically or graphically.
- Graph the basic parent functions; including linear, absolute value, quadratic, square root, cube root, exponential, logarithmic and reciprocal with and without the use of technology.
- Identify the key characteristic of the parent functions using domain, range, local maxima and minima, global maxima and minima, and intervals of increasing and

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decreasing.
- Write and graph transformations of each of the parent graphs. Given an equation, be able to explain the transformations without graphing.
- Write absolute value functions as piecewise functions.
- Graph piecewise functions and describe domain and range.
- Identify key characteristics of a quadratic function; including vertex intercepts, and axis of symmetry, using both algebraic and graphical approaches.
- Solve real-world problems involving a variety of functions.
- Form the sum, difference, product, and quotient of two functions, both polynomial and rational, and find its domain.
- Form the composite function and find the domain.
- Find the components of a composite function.
- Discover multiple compositions and decompositions for a given function.
- CBL Activities – Matching the Graph
- Time v. Distance
- Modeling Step Functions.
- Scatter Plots – Creating Best Fit Lines; analyze goodness of fit, use for prediction.
- Graphing Calculator Discovery – Characteristics of Family of Curves
- Effects of Transformations.

Assessments

<u>Formative:</u>
- Classwork and Homework
- Daily Practice Problems
- Teacher Observation
- Math Scavenger Hunt/Trail

<u>Summative:</u>
- Mid-unit Quizzes
- Topic Tests

<u>Alternative:</u>
- Observation Assessment with Problem-solving
- Project - create a picture and write a piecewise function to design it
- Kahoot/Quizizz
- Individual or group productive struggle assessment during introductory lessons

Interdisciplinary Connections

Science: HS-ETS1-2: In this quadratics unit students will design a solution to a complex real-world problem involving maximum/minimum/projectile motion by breaking it down into smaller, more manageable problems that can be solved through

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engineering.
CS&DT: 8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

Career Readiness, Life Literacies, and Key Skills

Technology Integration

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

- 9.4.8.TL.6: Collaborate to develop and publish work that provides perspectives on a real-world problem.

Students will access the Big Ideas online ebook to further investigate lesson concepts and demonstrate understanding of standards.

- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Students will use internet based game sites such as Quizizz, Kahoot, and Quizlet live to reflect on their learning progress.

- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

Supplemental instruction and math games will be presented using IXL Math and Video Tutor bigideasmath.com.

- 9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task

Students will use Google Classroom to collaborate, work towards solving authentic problems, or participate in an online classroom discussion utilizing pre-learned etiquette about blended learning platforms.

- 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

Students will use graphing calculators to use math tools strategically and attend to precision and will use Desmos in order to discover new concepts involving graphing and functions.

- 9.4.8.IML.3: Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping

Career Education

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CRP4: Communicate clearly and effectively with reason.
CRP11: Use technology to enhance productivity.

Time Frame	**4 weeks (20 blocks)**
Topic	
Polynomial and Rational Functions (Purple 4.1-4.6)	
Alignment to Standards	
<u>N.CN.8, N.CN.9, A.APR.2, A.APR.3, A.APR.6, F.IF.7c</u>	
Learning Objectives and Activities	

SWBAT answer the following questions:
- How do the characteristics of graphs relate to their corresponding equations?
- How can algebra help us get information about a graph from an equation?
- What are common characteristics of polynomials?
- What is the best method for graphing polynomials?
- How can technology assist in the understanding of graphing polynomials?
- What makes rational functions different from others that have been done so far?
- What types of discontinuity are present in rational functions?

SWBAT demonstrate understanding of the following:
- Functions can be written in several ways – certain forms can be helpful under different circumstances.
- Families of functions have common characteristics.
- We can use algebra to help graph functions.
- The vocabulary is just as important as the math.

Learning Activities:
- Examine graphs to determine end behavior.
- Identify polynomial functions and find the degree given both factored and standard form.
- Identify the zeros of a polynomial functions and its multiplicity.
- Investigate the role of multiplicity with respect to the graph of a polynomial.
- Investigate the role of the degree of a polynomial with respect to the number of turning points.
- Analyze the graph of a polynomial function given both factored and standard form; identify the intercepts, end behavior, and turning points.

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- Construct graphs given limited information.
- Form polynomials from zeros and graphs. Build polynomials from given characteristics.
- Investigation of End Behavior of nth-degree Polynomials with positive and negative coefficients.
- Use a graphing utility to approximate values of turning points.
- Factor polynomials of higher degree.
- Divide polynomials with long division and synthetic division.
- Apply the remainder and factor theorems to find remainders and factors.
- Apply the rational zero theorem to the list of potential zeros of a polynomial.
- Find the real and complex zeros of a polynomial.
- Apply the conjugate pair theorem to help write a polynomial in standard form and to help find other zeros.
- Form a polynomial with specified zeros, both real and complex.
- Solve polynomial equations for both real and complex zeros.
- Find the domain of a rational function.
- Determine the vertical asymptotes of a rational function.
- Determine the horizontal and oblique asymptotes of a rational function.
- Analyze the graph of rational function; determining the domain, intercepts symmetry, vertical, horizontal, and oblique asymptotes, and end behavior.
- Sketch the graph of a rational function by hand.
- *Solve polynomial or rational inequalities algebraically and graphically
- **Decompose a rational expression into partial fractions (11.5)
- Model Concentration of Medicine in Blood Stream.
- CBL – Investigating Boyle's Law.

Assessments

<u>Formative:</u>
- Daily Practice Problems
- Teacher Observation
- Entrance/Exit Cards

<u>Summative:</u>
- Mid-unit Quizzes
- Topic Tests

<u>Alternative:</u>
- Individual or group productive struggle assessment during graphing lessons - comparing, determining domain/range, transformations.
- Kahoot/Quizizz

Interdisciplinary Connections

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DEPARTMENT <u>Mathematics</u>   COURSE <u>Pre-Calculus</u>

Career Readiness, Life Literacies, and Key Skills
Technology Integration

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.
    ● 9.4.8.TL.6: Collaborate to develop and publish work that provides perspectives on a real-world problem.
Students will access the Big Ideas online ebook to further investigate lesson concepts and demonstrate understanding of standards.
    ● 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.
Students will use internet based game sites such as Quizizz, Kahoot, and Quizlet live to reflect on their learning progress.
    ● 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
Supplemental instruction and math games will be presented using IXL Math and Video Tutor bigideasmath.com.
    ● 9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task
Students will use Google Classroom to collaborate, work towards solving authentic problems, or participate in an online classroom discussion utilizing pre-learned etiquette about blended learning platforms.
    ● 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.
Students will use graphing calculators to use math tools strategically and attend to precision and will use Desmos in order to discover new concepts involving graphing and functions.
    ● 9.4.8.IML.3: Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping

Career Education
CRP6: Demonstrate creativity and innovation. CRP11: Use technology to enhance productivity.

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DEPARTMENT Mathematics   COURSE Pre-Calculus

Time Frame	2 weeks (10 blocks)
Topic	
Exponential and Logarithmic Functions (Purple 5.3-5.9)	
Alignment to Standards	
F.IF.4, F.IF.7e, F.LE.4	
Learning Objectives and Activities	

SWBAT answer the following questions:
- How can an exponential function represent a real-world scenario?
- How can the properties of logarithms be used to solve equations?
- Why does simplifying or expanding a logarithmic expression help us solve problems?
- Why is the number e important?
- What is the purpose of a logistic model?

SWBAT demonstrate understanding of the following:
- Functions families have common characteristics.
- We can use algebra to help graph functions.
- Knowing how to read an equation is essential for graphing the function.
- Mathematics applies to the sciences.

Learning Activities:
- Evaluate exponential functions.
- Graph exponential functions and transformations of such. M&M Lab – modeling exponential decay.
- Define the number e.
- Compound versus Simple Interest Activity
- Solve exponential equations.
- Change exponential expressions to logarithmic expressions and vis-versa.
- Evaluate logarithmic functions.
- Determine the domain of a logarithmic function.
- Graph logarithmic functions and transformations of such.
- Solve logarithmic equations.
- Expand and condense logarithmic expressions.
- Use properties of logarithms and exponents to solve equations algebraically.
- Use exponential and logarithmic functions to describe real world scenarios including growth and decay.

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- Use exponential models to create financial models with compound, simple interest.
- Discover that using log base 10 and natural log will result in the same answer when solving equations. Why is that?
- CBL – Newton's Law of Cooling
- **Logistic – spread of a rumor/virus
- **Develop motivation for Logistic Model by conjecturing the conditions that population growth is limited.

Assessments

<u>Formative:</u>
- Classwork and Homework
- Kuta Practice Problems
- Math Scavenger Hunt/Trail
- Entrance/Exit Cards

<u>Summative:</u>
- Mid-unit Quizzes
- Topic Tests

<u>Alternative:</u>
- Individual or group productive struggle assessment during introductory lessons with inverse relationships.
- Kahoot/Quizizz
- Project - find a real life example of exponential and logarithmic data and create a model of best fit.

Interdisciplinary Connections

Science: HS-LS1-4: In analyzing populations students will use a model to illustrate the role of cellular division and differentiation in producing and maintaining complex organisms mathematically using growth, decay, half-life, and logistic models.

Career Readiness, Life Literacies, and Key Skills

9.1.12.CDM.8: In the logarithmic unit students will compare and compute interest and compound interest and develop an amortization table using business tools.
9.1.12.CDM.6: When learning exponential equations students will 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.)

Technology Integration

All students will use digital tools to access, manage, evaluate, and synthesize

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information in order to solve problems individually and collaboratively and to create and communicate knowledge.

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Students will use graphing calculators to use math tools strategically and attend to precision and will use Desmos in order to discover new concepts involving graphing and functions.

- 9.4.8.IML.3: Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping

Career Education
CRP2: Apply appropriate academic and technical skills. CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.

Time Frame	**3 weeks (15 blocks); College Prep Level: 4 weeks (20 blocks)**
Topic	
Trigonometry: Triangles, Angles, Unit Circle (Purple 6.1-6.2)	

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Alignment to Standards

A.REI.4, F.TF.1, F.TF.2, F.TF.3, G.SRT.8

Learning Objectives and Activities

SWBAT answer the following questions:
- Mathematically speaking, how does what you learned today connect with what you learned yesterday, and what you will learn tomorrow?
- How can we find out information for all different types of triangles?

SWBAT demonstrate understanding of the following:
- Precalculus connects discrete pieces of mathematics from your past learning.
- Trigonometry allows for indirect measurement of triangles when given limited information.
- There exists a distinct and definite bridge between the worlds of algebra and algebraic thinking and the field of geometry.

Learning Activities:
- Review, discuss, and practice algebra skills from summer assignment which include equations in one variable, linear equations in two variables, function notation, quadratic equations, synthetic substitution and division, radicals, rational expressions and domain.
- Review, discuss, and practice trigonometry skills from summer assignment which include right triangle trigonometry and problems involving angles of elevation and depression.
- Relate right triangle trigonometry to the ratio of sides of a triangle relating it to the algorithm used in a calculator.
- Identify co-terminal and reference angles using degrees.
- Create a unit circle from its relationship to right triangle trigonometry.
- Use the unit circle to evaluate all six trigonometric relations; use the calculator to evaluate each relation.
- Evaluate trigonometric functions of any angle using reference angles.
- CBL – Gathering temperatures at certain time intervals to determine period and amplitude.
- Angular/Linear Speed Relationship – given one speed find the other and convert to appropriate units.

Assessments

<u>Formative:</u>
- Classwork and Homework
- Kuta Practice Problems

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- Teacher Observation
- Entrance/Exit Cards

<u>Summative:</u>
- Mid-unit Quizzes
- Topic Tests

<u>Alternative:</u>
- Kahoot/Quizizz
- Individual or group productive struggle assessment during unit circle application.

Interdisciplinary Connections

Career Readiness, Life Literacies, and Key Skills

Technology Integration

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.
- 9.4.8.TL.6: Collaborate to develop and publish work that provides perspectives on a real-world problem.

Students will access the Big Ideas online ebook to further investigate lesson concepts and demonstrate understanding of standards.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

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- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

Supplemental instruction and math games will be presented using IXL Math and Video Tutor bigideasmath.com.
- 9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task

Students will use Google Classroom to collaborate, work towards solving authentic problems, or participate in an online classroom discussion utilizing pre-learned etiquette about blended learning platforms.
- 9.4.12.TL.4: Collaborate in online learning communities or social networks or

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virtual worlds to analyze and propose a resolution to a real-world problem. Students will use graphing calculators to use math tools strategically and attend to precision and will use Desmos in order to discover new concepts involving graphing and functions.

- 9.4.8.IML.3: Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping

Career Education

CRP6: Demonstrate creativity and innovation.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.

Time Frame	**2 weeks (10 blocks); College Prep Level: 3 weeks (15 blocks)**
Topic	
Trigonometric Graphs (Purple 6.3-6.6)	
Alignment to Standards	
F.IF.7e, F.TF.4, F.TF.5, F.TF.6	
Learning Objectives and Activities	

SWBAT answer the following questions:
- How do we use the unit circle to create a graph for each of the six trigonometric functions?
- Where do the common characteristics of sinusoidal functions come from?
- How does the equation for a function affect the graph of that function?
- What does it mean to find and exact value?

SWBAT demonstrate understanding of the following:
- The unit circle is a gateway between geometry and algebra.
- Members within a family of functions have common characteristics.
- Inverse functions can be found and verified in a variety of ways.
- Decimals can be good approximations of exact values.

Learning Activities:
- Graph sine and cosine functions applying the knowledge of the unit circle.

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- Sketch the graph of tangent and cotangent functions.
- Sketch the graph of secant and cosecant functions using the graphs of cosine and sine as aides.
- Describe important characteristics of the graphs of the six trigonometric functions (domain, range, max/min, increasing, decreasing, x-intercepts, y-intercepts).
- Sketch the graphs of the sine and cosine functions both by hand and with graphing technology using the concepts of amplitude and period including those with transformations.
- Write equations for transformed sine and cosine functions.
- Determine the restrictions on the domain for the sine function and the cosine function in order for the inverse to also be a function.
- Calculate both exact and approximate values for inverse sine and cosine.
- CBL – Tuning Fork Lab (sinusoid)
- Discover applications of sinusoids (tides, Ferris Wheel, average temp (temp versus month), harmonic motion, etc)

Assessments

<u>Formative:</u>
- Classwork and Homework
- Daily Practice Problems
- Teacher Observation

<u>Summative:</u>
- Mid-unit Quizzes
- Topic Tests

<u>Alternative:</u>
- Project - create your own problem using a ferris wheel or tides and create your own questions and answers as a quiz grade.
- Kahoot/Quizizz
- Individual or group productive struggle assessment writing equation given the graph.

Interdisciplinary Connections

Career Readiness, Life Literacies, and Key Skills

Technology Integration

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Career Education

CRP6: Demonstrate creativity and innovation.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.

Time Frame	2 weeks (10 blocks); College Prep Level: 3 weeks (15 blocks)
Topic	

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Analytic Trigonometry: Equations and Identities (Ch7)
Alignment to Standards
[F.TF.7, F.TF.8, F.TF.9](#)
Learning Objectives and Activities

SWBAT answer the following questions:
- What does it mean when we solve a trigonometric equation?
- How do we represent multiple solutions on a given domain?
- What does it mean to prove an identity?
- How can we use identities to simplify the process involved in solving an equation?

SWBAT demonstrate understanding of the following:
- The solutions to an equation can be represented graphically as the intersection of two functions.
- Sinusoidal functions have an infinite number of solutions that are the same interval apart.
- Equivalent expressions can be written in a variety of formats.
- There exists a distinct and definite connection between the fields of geometry and algebra

Learning Activities:
- Solve equations involving sine and cosine using algebraic and graphical techniques.
- Solving equations involving frequency changes of sine and cosine using algebraic and graphical techniques.
- Find exact values of trigonometric functions using sum and difference formulas.
- Find exact values of trigonometric functions using double angle and half angle identities.
- Prove trigonometric identities using Pythagorean, reciprocal, and quotient identities.
- Connections to Algebra – Relate familiar factoring skills to trigonometric relations to solve trigonometric equations.
- Verifying Trigonometric Identities – A Graphical Approach
- Solving Trigonometric Equations – A Graphical Approach

Assessments

<u>Formative:</u>
- Classwork and Homework
- Teacher Observation
- Entrance/Exit Cards

<u>Summative:</u>

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- Mid-unit Quizzes: Connections to Algebra – Relate familiar factoring skills to trigonometric relations to solve trigonometric equations.
- Topic Tests

<u>Alternative:</u>
- Kahoot/Quizizz
- Individual or group productive struggle assessment during introductory lessons

Interdisciplinary Connections

Science: HS-LS2-1: Students will use mathematical and/or computational representations to support explanations of factors that affect the carrying capacity of ecosystems at different scales when analyzing trigonometric graphs.

Career Readiness, Life Literacies, and Key Skills

Technology Integration

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Students will access the Big Ideas online ebook to further investigate lesson concepts and demonstrate understanding of standards.
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- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

Supplemental instruction and math games will be presented using IXL Math and Video Tutor bigideasmath.com.
- 9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task

Students will use Google Classroom to collaborate, work towards solving authentic problems, or participate in an online classroom discussion utilizing pre-learned etiquette about blended learning platforms.
- 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

* Topic completed in Advanced/Honors; in regular level differentiate topics and include if time permits.

** Topic is completed in only Honors.

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Students will use graphing calculators to use math tools strategically and attend to precision and will use Desmos in order to discover new concepts involving graphing and functions.
- 9.4.8.IML.3: Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping

Career Education

CRP2: Apply appropriate academic and technical skills.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.

Time Frame	**1 weeks (5 blocks)**

Topic

Polar Coordinates/Graphs** and Vectors* (9.1-9.2, 9.4)

Alignment to Standards

<u>G.SRT.9, G.SRT.10, G.SRT.11, N.VM.1, N.VM.2, N.VM.3, N.VM.4, N.VM.5</u>

Learning Objectives and Activities

SWBAT answer the following questions:
- How do we use algebra to manipulate expressions to do what we want them to do?
- How can representing physics applications using vectors help us determine the resultant effect of multiple forces on an object?

SWBAT demonstrate understanding of the following:
- There exists a definite and distinct bridge between the fields of trigonometry and physics.
- Characteristics of sinusoidal functions can affect how we use them to solve right triangles.
- Multiple ways of representing real world phenomena can be used to solve problems.
- What is the difference between a rectangular and polar graph? How can we convert between the two?

Learning Activities:
- *Represent vectors as a directed line segment.

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- *Write vectors in component form, perform basic vector operations with vectors, and find the direction angle of a vector.
- *Find the resultant of two vectors.
- *Use vectors to solve real life problems including, but not limited to, velocity.
- **Plotting polar coordinates, converting from polar to rectangular and vis-versa.
- **Graphing polar equations from rectangular form.
- **Applications of Right Triangle Trigonometry.

Assessments

Formative:
- Classwork and Homework
- Teacher Observation
- Entrance/Exit Cards

Summative:
- Mid-unit Quizzes
- Topic Tests

Alternative:
- Project - using Desmos create a polar graph
- Kahoot/Quizizz

Interdisciplinary Connections

Career Readiness, Life Literacies, and Key Skills

Technology Integration

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.
- 9.4.8.TL.6: Collaborate to develop and publish work that provides perspectives on a real-world problem.

Students will access the Big Ideas online ebook to further investigate lesson concepts and demonstrate understanding of standards.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Students will use internet based game sites such as Quizizz, Kahoot, and Quizlet live to reflect on their learning progress.

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Career Education
CRP2: Apply appropriate academic and technical skills. CRP6: Demonstrate creativity and innovation.

Time Frame	**2 week (10 blocks)**
Topic	
Introduction to Limits and Continuity* (14.1-14.4)	
Alignment to Standards	
[F.IF.6](#)	
Learning Objectives and Activities	
SWBAT answer the following questions: ● What characteristics does a function need to have for a limit to exist? ● What does it mean to have a limit equal infinity? ● Why does the slope of a secant line change as x approaches a point? ● What is the average rate of change and how can functions and graphs help model it?	

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- Is a function continuous at a particular value of x?
- Is a function considered a continuous function?
- What is the derivative? What is its purpose? How does it relate to what we have already done?

SWBAT demonstrate understanding of the following:
- What does it mean to have a limit equal infinity?
- Why does the slope of a secant line change as x approaches a point?
- What is the rate of change and how can functions and graphs help model it?
- What is the difference between the average rate of change and instantaneous rate of change?
- Is a function continuous at a particular value of x?
- Is a function considered a continuous function?

Learning Activities:
- *Define a limit.
- *Find the value of a limit graphically and as a table, including limits at infinity.
- *Find the limit algebraically
- *Find one sided limits graphically and algebraically.
- *Determine the x-values at which a function is continuous/discontinuous
- **Find the average rate of change of a secant line for a function.
- **Find the slope of a line tangent to a function at a given point using limits.
- *Find limits and determine continuity of piecewise functions.
- Graph piecewise functions by hand.
- *Use graphs to determine, one-sided limits and continuity of those functions.

Assessments

<u>Formative:</u>
- Daily Practice Problems
- Teacher Observation
- Math Scavenger Hunt/Trail

<u>Summative:</u>
- Mid-unit Quizzes
- Topic Tests

<u>Benchmark:</u>
- Cumulative final exam with multiple choice, short answer, and extended constructed

<u>Alternative:</u>
- Observation Assessment with Problem-solving
- Individual or group productive struggle assessment during introductory lessons

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Interdisciplinary Connections

ELA: W.11-12.1: When students are justifying their reasoning on short answer and extended constructed response questions they write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

Career Readiness, Life Literacies, and Key Skills

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and spatial grouping
Career Education
CRP2: Apply appropriate academic and technical skills. CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.

Modifications (ELL, Special Education, At Risk Students, Gifted & Talented, & 504 Plans)

ELL:
- Work toward longer passages as skills in English increase
- Use visuals
- Introduce key vocabulary before lesson
- Teacher models reading aloud daily
- Provide peer tutoring
- Use of Bilingual Dictionary
- Guided notes and/or scaffold outline for written assignments
- Provide students with English Learner leveled readers.

Supports for Students With IEPs:
- Allow extra time to complete assignments or tests
- Guided notes and/or scaffold outline for written assignments
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow all IEP modifications

At-Risk Students:
- Guided notes and/or scaffold outline for written assignments
- Introduce key vocabulary before lesson
- Work in a small group
- Lesson taught again using a differentiated approach
- Allow answers to be given orally or dictated
- Use visuals / Anchor Charts
- Leveled texts according to ability

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Gifted and Talented:
- Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)
- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Organize and offer flexible small group learning activities
- Provide whole group enrichment explorations
- Teach cognitive and methodological skills
- Use center, stations, or contracts
- Organize integrated problem-solving simulations
- Propose interest-based extension activities
- Expose students to beyond level texts.

Supports for Students With 504 Plans:
- Follow all the 504 plan modifications
- Text to speech/audio recorded selections
- Amplification system as needed
- Leveled texts according to ability
- Fine motor skill stations embedded in rotation as needed
- Modified or constrained spelling word lists
- Provide anchor charts with high frequency words and phonemic patterns

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