



Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

SPARTAN MISSION:

Meeting the needs of all students with a proud tradition of academic excellence.

DEPARTMENT Mathematics

COURSE Multivariable Calculus Honors

Curriculum Development Timeline

School: Ocean Township High School

Course: Multivariable Calculus Honors

Department: Mathematics

Board Approval	Supervisor	Notes
June 2015	Janet Bluefield	Born Date
August 2017	Nichole Kerney	Revisions
August 2019	Nichole Kerney	Review
August 2022	Gerard Marrone	Alignment to Standards
August 2025	Greg Colon	Alignment to Standards

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COURSE Multivariable Calculus Honors

Township of Ocean Pacing Guide			
Week	Marking Period 1	Week	Marking Period 3
1	Integration Techniques	21	Functions of Several Variables
2	Integration Techniques	22	Functions of Several Variables
3	Integration Techniques	23	Functions of Several Variables
4	Integration Techniques	24	Functions of Several Variables
5	Parametric Equations & Polar Coordinates	25	Functions of Several Variables
6	Parametric Equations & Polar Coordinates	26	Multiple Integration
7	Parametric Equations & Polar Coordinates	27	Multiple Integration
8	Parametric Equations & Polar Coordinates	28	Multiple Integration
8	Vectors & The Geometry of Space	29	Multiple Integration
10	Vectors & The Geometry of Space	30	Multiple Integration
Week	Marking Period 2	Week	Marking Period 4
11	Vectors & The Geometry of Space	31	Multiple Integration
12	Vectors & The Geometry of Space	32	Multiple Integration
13	Vector-Valued Functions	33	Multiple Integration
14	Vector-Valued Functions	34	Vector Analysis
15	Vector-Valued Functions	35	Vector Analysis
16	Vector-Valued Functions	36	Vector Analysis
17	Vector-Valued Functions	37	Vector Analysis
18	Functions of Several Variables	38	Vector Analysis

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19	Functions of Several Variables	39	Vector Analysis
20	Functions of Several Variables	40	Vector Analysis

Core Instructional & Supplemental Materials including various levels of Texts

Textbook: Calculus 10th Edition, Larson ©2014

Supplemental:

Time Frame	4 cycles ~ 12 (56 minute) days
Topic	
Integration Techniques	
Alignment to Standards	
A-SSE.A.1 Interpret the structure of expressions Interpret expressions that represent a quantity in terms of its context. A-SSE.A.2 Interpret the structure of expressions Use the structure of an expression to identify ways to rewrite it A-CED.A.2 Create equations that describe numbers or relationships Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. A-CED.A.4 Create equations that describe numbers or relationships Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations A-REI.D.10 Represent and solve equations and inequalities graphically Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). A-REI.D.11 Represent and solve equations and inequalities graphically Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. F-IF.B.4 Interpret functions that arise in application in terms of the context 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 F-IF.B.5 Interpret functions that arise in application in terms of the context	

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Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

F-IF.B.6 Interpret functions that arise in application in terms of the context

Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph

F-IF.C.7 Analyze functions using difference representations

Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases

G-MG.A.3 Apply geometric concepts in modeling situations

Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).

Learning Objectives and Activities

SWBAT answer the following questions:

- What are differential equations?
- How is integration related to differentiation?
- How is integration used in chemistry, physics, and space?

SWBAT demonstrate understanding of the following:

- Know the relationship between integration and differentiation.
- Use specific integration techniques when appropriate – integration by parts, partial fractions, trigonometric substitution, completing the square, and trigonometric powers.
- The units of a particular solution or computation and how it relates to the question.

Learning Activities:

- Find an antiderivative using integration by parts.
- Recognize when tabular integration is applied.
- Understand the concept of partial fraction decomposition.
- Use partial fraction decomposition with linear factors to integrate rational functions.
- Use partial fraction decomposition with quadratic factors to integrate rational functions.
- Use long division with partial fraction decomposition to integrate rational functions
- Recognize the appropriate trigonometric substitution and relate that substitution to an appropriate right triangle.
- Know that integration by trigonometric substitution may require additional integration techniques.
- Use the method of completing the square to find an antiderivative.
- Use trigonometric identities to find antiderivatives of functions defined by trigonometric powers
- Exploration – unique challenges to study concepts as reinforcement and/or to study concepts not yet formally covered.
- Note taking – students actively engaged with teacher in conversation about concepts

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and ideas, continuously questioning and practicing during this process.

- Projects – real life exercises solved by students using concepts and techniques generated in class.
- Think Pair Share – students work together by taking a moment to gather their thoughts and share them with their peers

Assessments

Formative:

- Classwork and Homework
- Teacher Observation
- Class Debate of Approaches/Mathematical Methods

Summative:

- Mid-unit Quizzes
- Topic Tests

Alternative:

- Individual or group productive struggle assessment during introductory lessons

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

- 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

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COURSE Multivariable Calculus Honors

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.

Time Frame	4 cycles ~ 12 (56 minute) days
Topic	
Parametric Equations & Polar Coordinates	
Alignment to Standards	
A-SSE.B.3 Write expressions in equivalent forms to solve problems Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression A-CED.A.2 Create equations that describe numbers or relationships Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. F-IF.A.1 Understand the concept of a function and use function notation Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$ F-IF.B.5 Interpret functions that arise in application in terms of the context Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.	
Learning Objectives and Activities	
SWBAT answer the following questions: - What is the intensity of radiation emitted from an antenna? - How far does a planet travel along its orbit? - How much area is needed to fill a parabolic shaped window bounded below by a circle? SWBAT demonstrate understanding of the following: - Represent curves or parts of curves parametrically.	

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- Represent conic sections with rectangular and polar relations.
- Understand the representation of area and arc length in rectangular and polar coordinates.

Learning Activities:

- Exploration – unique challenges to study concepts as reinforcement and/or to study concepts not yet formally covered.
- Note taking – students actively engaged with teacher in conversation about concepts and ideas, continuously questioning and practicing during this process.
- Projects – real life exercises solved by students using concepts and techniques generated in class.
- Think Pair Share – students work together by taking a moment to gather their thoughts and share them with their peers.

Assessments

Formative:

- Daily Practice Problems
- Teacher Observation
- Entrance/Exit Cards

Summative:

- Mid-unit Quizzes
- Topic Tests

Alternative:

- Project - area of a surface of revolution

Interdisciplinary Connections

Career Readiness, Life Literacies, and Key Skills

Technology Integration

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- 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

CRP2: Apply appropriate academic and technical skills.

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

Time Frame	4 cycles ~ 12 (56 minute) days
Topic	
Vectors & The Geometry of Space	
Alignment to Standards	
N-VM.A.1 Represent and model with vector quantities. Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, v, v, v). N-VM.A.2 Represent and model with vector quantities. Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point N-VM.A.3 Represent and model with vector quantities. Solve problems involving velocity and other quantities that can be represented by vectors N-VM.B.4 Perform operations on vectors. Add and subtract vectors. N-VM.B.5 Perform operations on vectors. Multiply a vector by a scalar G-GMD.B.4 Visualize relationships between two-dimensional and three-dimensional objects. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and	

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DEPARTMENT Mathematics

COURSE Multivariable Calculus Honors

identify three-dimensional objects generated by rotations of two-dimensional objects

Learning Objectives and Activities

SWBAT answer the following questions:

- How much work is needed to pull a sled up an incline?
- How can we use vectors to analyze the flight of a plane?
- How much torque is being applied to the fulcrum of a crankshaft?
- How can we use vectors to write equations of plane?
- How can the equations of functions in three dimensions be constructed visually?
- How can we create equations for three dimensional space?
- What are the defining characteristics for quadric surfaces and how are they determined?
- What is the right hand rule for vectors and how does it apply in determining a solution?

SWBAT demonstrate understanding of the following:

- Represent position and motion in space using vectors.
- Relation of vectors to their dot product and cross product.
- Relation of two-space to three space via vectors.
- Use of vectors to represent planes in space.

Learning Activities:

- Exploration – unique challenges to study concepts as reinforcement and/or to study concepts not yet formally covered.
- Note taking – students actively engaged with teacher in conversation about concepts and ideas, continuously questioning and practicing during this process.
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- Think Pair Share – students work together by taking a moment to gather their thoughts and share them with their peers

Assessments

Formative:

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

Summative:

- Mid-unit Quizzes
- Topic Tests

Alternative:

- Individual or group productive struggle assessment during introductory lessons

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DEPARTMENT Mathematics

COURSE Multivariable Calculus Honors

Interdisciplinary Connections

Career Readiness, Life Literacies, and Key Skills

Technology Integration

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- 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.

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- 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

5 cycles ~ 15 (56 minute) days

Topic

Vector-Valued Functions

Alignment to Standards

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COURSE Multivariable Calculus Honors

N-VM.A.3 Represent and model with vector quantities

Solve problems involving velocity and other quantities that can be represented by vectors

G-C.B.5 Find arc lengths and areas of sectors of circles

Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector

Learning Objectives and Activities

SWBAT answer the following questions:

- How can vector-valued functions be used to predict speed and velocity in space?
- How can vector-valued functions be used in athletics?
- How do we model three-dimensional structures using vector-valued functions?

SWBAT demonstrate understanding of the following:

- Extend the concepts of limits and continuity to vector-valued functions.
- Analyze speed and velocity in space using vector-valued functions.
- Determine the calculus of vector-valued functions.

Learning Activities:

- Exploration – unique challenges to study concepts as reinforcement and/or to study concepts not yet formally covered.
- Note taking – students actively engaged with teacher in conversation about concepts and ideas, continuously questioning and practicing during this process.
- Projects – real life exercises solved by students using concepts and techniques generated in class.
- Think Pair Share – students work together by taking a moment to gather their thoughts and share them with their peers.

Assessments

Formative:

- Classwork and Homework
- Teacher Observation
- Class Debate of Approaches/Mathematical Methods

Summative:

- Mid-unit Quizzes
- Topic Tests
- Problem-based Quiz/Test

Alternative:

- Project - velocity and acceleration science application

Interdisciplinary Connections

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Career Readiness, Life Literacies, and Key Skills
Technology Integration
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Career Education
CRP2: Apply appropriate academic and technical skills. CRP11: Use technology to enhance productivity.

Time Frame	8 cycles ~ 25 (56 minute) days
Topic	
Functions of Several Variables	
Alignment to Standards	
F-IF.A.2 Understand the concept of a function and use function notation	

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COURSE Multivariable Calculus Honors

Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context

F-IF.A.3 Understand the concept of a function and use function notation

Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.

F-IF.B.4 Interpret functions that arise in application in terms of the context

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

F-IF.C.8 Analyze functions using different representations

Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function

G-C.A.4 Understand and apply theorems about circles

Construct a tangent line from a point outside a given circle to the circle.

Learning Objectives and Activities

SWBAT answer the following questions:

- How can real-life problems be characterized by functions of several variables? Such as logging, business, and chemistry?
- How do the concepts from single variable calculus apply and take form in multivariable calculus?
- What is a function of several variables?
- How do the concepts and rules of differentiation for functions of one variable extrapolate to functions of several variables?
- How do you determine maximum, minimum and saddle points for functions of several variables?
- What is the gradient of a function?
- How does the method of Lagrange Multipliers work?

SWBAT demonstrate understanding of the following:

- Compute rates of change of functions of several variables.
- Use gradient and normal vectors describe characteristics of curves.
- Determine extrema of functions of several variables.
- Lagrange multipliers as a method to solve boundary (constraint) problems.

Learning Activities:

- Exploration – unique challenges to study concepts as reinforcement and/or to study concepts not yet formally covered.
- Note taking – students actively engaged with teacher in conversation about concepts and ideas, continuously questioning and practicing during this process.
- Projects – real life exercises solved by students using concepts and techniques generated in class.

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- Think Pair Share – students work together by taking a moment to gather their thoughts and share them with their peers.

Assessments

Formative:

- Daily Practice Problems
- Teacher Observation
- Entrance/Exit Cards

Summative:

- Mid-unit Quizzes
- Topic Tests

Alternative:

- Individual or group productive struggle assessment during introductory lessons

Interdisciplinary Connections

Science: HS-ETS1-2: Students will design a solution to a complex real-world problem involving maximum and minimum by breaking it down into smaller, more manageable problems that can be solved through engineering.

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

- 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.

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- 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

CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.
CRP11: Use technology to enhance productivity.

Time Frame	8 cycles ~ 24 (56 minute) days
Topic	
Multiple Integration	
Alignment to Standards	
N-CN.B.4 Represent complex numbers and their operations on the complex plane. Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number. G.GMD.B.4 Visualize relationships between two-dimensional and three-dimensional objects Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. A-CED.A.2 Create equations that describe numbers or relationships Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. A-SSE.A.2 Interpret the structure of expressions Use the structure of an expression to identify ways to rewrite it F-IF.C.8 Analyze functions using different representations Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function	
Learning Objectives and Activities	
SWBAT answer the following questions: - How can real-life problems be described by multiple integrals? Such as average production of automobiles, population density, and center pressure on a sail. - How do the concepts of the definite integral relate to multiple integrals in multivariable calculus? - What is the definition of a multiple integral? - How can an integral from Cartesian coordinates be converted to Polar, Cylindrical or	

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Spherical coordinates?

- How are multiple and iterated integrals applied to real world problems?

SWBAT demonstrate understanding of the following:

- Represent area and volume with multiple integrals.
- Change variables of a multiple integral.
- Represent and evaluate multiple integrals that determine the center of mass.
- Lagrange multipliers as a method to solve boundary (constraint) problems.

Learning Activities:

- Exploration – unique challenges to study concepts as reinforcement and/or to study concepts not yet formally covered.
- Note taking – students actively engaged with teacher in conversation about concepts and ideas, continuously questioning and practicing during this process.
- Projects – real life exercises solved by students using concepts and techniques generated in class.
- Think Pair Share – students work together by taking a moment to gather their thoughts and share them with their peers.

Assessments

Formative:

- Classwork and Homework
- Teacher Observation
- Class Debate of Approaches/Mathematical Methods
- Graphic Organizer
- Entrance/Exit Cards

Summative:

- Mid-unit Quizzes
- Topic Tests
- Problem-based Quiz/Test

Alternative:

- Observation Assessment with Problem-solving
- Individual or group productive struggle assessment during introductory lessons

Interdisciplinary Connections

Career Readiness, Life Literacies, and Key Skills

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- 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.

CRP11: Use technology to enhance productivity.

Time Frame

7 cycles ~ 21 (56 minute) days

Topic

Vector Analysis

Alignment to Standards

[F.LE.5](#), [N.VM.1](#), [N.VM.5.b](#), [N.VM.6](#), [N.VM.11](#)

F-LEB.B.5 Interpret expressions for functions in terms of the situation they model

Interpret the parameters in a linear or exponential function in terms of a context

N-VM.A.1 Represent and model with vector quantities.

Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., $\mathbf{v}$, $|\mathbf{v}|$, $\|\mathbf{v}\|$, v)

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Meeting the needs of all students with a proud tradition of academic excellence.

DEPARTMENT Mathematics

COURSE Multivariable Calculus Honors

N-VM.B.5 Perform operations on vectors

Multiply a vector by a scalar

N-VM.C.6 Perform operations on matrices and use matrices in applications.

Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network

N-VM.C.11 Perform operations on matrices and use matrices in applications.

Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors

Learning Objectives and Activities

SWBAT answer the following questions:

- How are vector fields determined to be conservative? What does this mean?
- How can a line integral be used to find the mass of a spring?
- How can curl be used to analyze the motion of a rotating liquid?
- What is a vector field?
- What is the fundamental theorem for line-integrals?
- What is Green's Theorem?
- What is the relationship between curl and divergence?
- What is the relationship between the Fundamental Theorem of Calculus, Fundamental Theorem for Line Integrals, Green's Theorem, and Stoke's Theorem and the Divergence Theorem?

SWBAT demonstrate understanding of the following:

- Different applications of vector fields.
- Determining the conservation of a vector field.
- Meaning of the theorems of Green and Stoke.

Learning Activities:

- Exploration – unique challenges to study concepts as reinforcement and/or to study concepts not yet formally covered.
- Note taking – students actively engaged with teacher in conversation about concepts and ideas, continuously questioning and practicing during this process.
- Projects – real life exercises solved by students using concepts and techniques generated in class.
- Think Pair Share – students work together by taking a moment to gather their thoughts and share them with their peers.

Assessments

Formative:

- Classwork and Homework
- Teacher Observation

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- Class Debate of Approaches/Mathematical Methods
- Entrance/Exit Cards

Summative:

- Mid-unit Quizzes
- Topic Tests
- Problem-based Quiz/Test

Benchmark:

- Cumulative final exam with multiple choice, short answer, and extended constructed response questions.

Alternative:

- Observation Assessment with Problem-solving
- Individual or group productive struggle assessment during introductory lessons

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

9.3.ST.5: Demonstrate an understanding of the breadth of career opportunities and means to those opportunities in each of the Science, Technology, Engineering & Mathematics Career Pathways.

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

- 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

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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.

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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