Washington Township School District

***The mission of the Washington Township Public Schools** is to provide a safe, positive, and progressive educational environment that provides opportunity for all students to attain the knowledge and skills specified in the NJ Learning Standards at all grade levels, so as to ensure their full participation in an ever-changing world as responsible, self-directed and civic-minded citizens.*

Course Title:	**Honors Precalculus**
Grade Level(s):	11-12

Duration:	*Full Year:*	**x**	*Semester:*		*Marking Period:*	
Course Description:	Honors precalculus is a five-credit course that follows the successful completion of Honors Geometry and Honors Algebra 2 with a yearly average of 85 or better in both classes. This course will focus on the traditional precalculus topics, as well as emphasize the use of technology to graph, solve and analyze data. The course covers graphical analysis, linear and quadratic functions, polynomial and rational functions, exponential and logarithmic functions, trigonometric functions, analytic trigonometry, applications of trigonometric functions, systems of equations and inequalities, sequences, and a preview of calculus. This course stresses the appropriate use of technology; therefore, a graphing calculator is required.					
Grading Procedures:	Each semester will be a composite of quiz scores, test scores, homework, and participation reflecting a student's mastery of the areas outlined above. The student can pass the course with an overall average of 70%. The individual teacher will explain the grading system to the student.					
Primary Resources:	**NJDOE HS Mathematics Curriculum** **NJ Student Learning Standards Mathematics (NJSLS-M)** Precalculus: Graphical, Numerical, Algebraic 10th Edition by Demana, Waits, Foley, Kennedy and Bock, Copyright by Pearson Education Inc, 2019					

Washington Township Principles for Effective Teaching and Learning

- Implementing a standards-based curriculum
- Facilitating a learner-centered environment
- Using academic target language and providing comprehensible instruction
- Adapting and using age-appropriate authentic materials
- Providing performance-based assessment experiences
- Infusing 21st Century skills for College and Career Readiness in a global society

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Under the Direction of:	Dr. Carole English

Written: 8/30/2022

Revised:

BOE Approval:

Unit 1: Summer Assignment/ Prerequisites

Unit Description: Students will complete a summer assignment reviewing key concepts from algebra and geometry. The assignment will demonstrate student mastery of real numbers, the Cartesian coordinate system, and linear equations and inequalities. Students will demonstrate the ability to graphic equations of lines, parabolas, and circles. Students will solve linear and quadratic equations both algebraically and graphically. Students will use factoring skills to express the equation of a circle and standard form and then graph the circle using the center and radius.

Unit Duration: 5 days

Desired Results

Standard(s):
N-RN.B use properties of rational and irrational numbers
N-CN.A perform arithmetic operations with complex numbers
N-CN.C use complex numbers in polynomial identities and equations
A-SSE.B write expressions and equivalent forms to solve problems
A-CED.A create equations that describe numbers or relationships
A-REI.A understand and solving equations as a process of reasoning and explain the reasoning
A-REI.B solve equations and inequalities in one variable
A-REI.D represent and solve equations and inequalities graphically
F-IF.C analyze functions using different representations
S-ID.B summarize, represent, and interpret data on two categorical and quantitative variables
S-ID.C interpret linear models

Indicators:
N-RN.B.3 Explain why the sum or product of two rational numbers is rational; That the sum of a rational number and an irrational number is irrational; And that the product of a nonzero rational number and an irrational number is irrational.
N-CN.A.1 Know that there is a complex number *i* such that $i^2 = -1$, and every complex number has the form $a + bi$ with *a* and *b* real.
N-CN.A.2 use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers
N-CN.A.3 (+) find the conjugate of a number; Used conjugates to find moduli and quotients of complex numbers
N-CN.C.7 solve quadratic equations with real coefficients that have complex solutions
A-SSE.B.3a, 3b choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression*

a. Factor the quadratic expression to reveal the zeros of the function it defines
b. complete the square and a quadratic expression to reveal the maximum or minimum value of the function is defines

A-CED.A.1 Create equations and inequalities in one variable and use them to solve problems. Including equations arising from linear and quadratic functions, and simple rational and exponential functions
A-CED.A.2 create equations and two or more variables to represent relationships between quantities; Graph equations on coordinate axes with labels and scales
A-CED.A.4 rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations
A-REI.A.1 explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that they originally equation has a solution. Construct a viable argument to justify a solution method
A-REI.B.3 solve linear equations and inequalities in one variable, including equations with coefficients represented by letters
A-REI.B.4a, 4b solve quadratic equations in one variable

a. Use the method of completing the square to transform any quadratic equation in *x* into an equation of the form $(x – p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form
b. Solve quadratic equations by inspection, taking square roots, completing the square, the quadratic formula, and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers *a* and *b.*

A-REI.D.10 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 explain why the X-coordinates of the points where the graph of the equation y = f(x) and y = g(x) intercept are the solutions of the equation f(x) = g(x); Find the solutions approximately

F-IF.C.7a, 7b Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*

a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

F-IF.C.8a, 8b write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function

a. use the process of factoring and completing the square and quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context
b. use the properties of exponents to interpret expressions for exponential functions

S-ID.B.6a, 6b, 6c represent data on two quantitative variables on a scatter plot, and describe how the variables are related

a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models
b. informally assess the fit of a function by plotting and analyzing residuals
c. fit a linear function for a scatter plot that suggests a linear association

S-ID.C.7 interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data

Understandings:

Students will understand that…

There are four ways to represent a problem: algebraic, numeric, graphical and verbal. It is always beneficial to explore a problem using more than one of these representations.

Students will be able to…

- Make connections between real numbers, the Cartesian coordinate plane, plotting points and creating scatterplots (by hand and with technology)
- Calculate the distance, midpoint and slope between two points
- Graph an equation using a table
- Find x and y intercepts algebraically and graphically
- Graph circles on coordinate plane
- Graph linear functions and linear inequalities
- Solve/approximate solutions of equations algebraically, graphically, numerically and by using tables (when appropriate, using a grapher/technology)
- Review/understand the definition of complex numbers, including basic operations and conjugates
- Find complex solutions of quadratic equations
- Use interval notation to describe a set of values being used for a given context; (e.g., solution set, domain, range)

Essential questions:

- How do the points contained on a line determine the equation of the line?
- How can points on a line be used to calculate the distance, midpoint and slope between those two points?
- How can you graph an equation using a table of values? (including creating a scatterplot of the given table by hand or using technology)
- What methods can be used to find x and y intercepts algebraically and graphically?
- What is the standard form of the equation of a circle? How does it determine the graph of the circle?
- What is the relationship between the solutions to quadratic or linear equations and their graph, including, but not limited to real or complex solutions?
- How are solutions to a linear equation related to a graphical representation of the equation? How can a grapher or technology be used to approximate solutions?
- How can complex numbers be used to simplify expressions or solve equations?
- How can interval notation and inequalities be used to represent sets of numbers?

Assessment Evidence

Performance Tasks:	**Performance Tasks:**
Checkpoints Homework MyMathLab assignments Unit Quiz Mid-Chapter Checkpoint Exit/Admit Tickets	MyMathLab remediation Skill Refresher Review and Refresh exercises Vocabulary concept check Study Strategies Algebra Help

Benchmarks:
Chapter P Test
Performance Task Chapter P

Learning Plan

Learning Activities: *(this is a review of Algebra 1 & 2 and should be done in a quick, efficient manner)*

P.3/P.4 Linear equations and inequalities & Lines in the plane (1 day)

- Coordinate plane, plotting points, making scatter plots
- Finding the distance between two points
- Finding the midpoint between two points
- Graphing an equation on a coordinate plane using a table
- Finding x and y intercepts
- Graph circles
- Graph linear functions using slope and y-intercept
- Calculate slope between two points
- Write equations of lines using slope and a point or two points
- Writing equations of lines parallel to a given line
- Writing equations of lines perpendicular to a given line.

P.5 Solving equations graphically, numerically, and algebraically (1 day)

- Solving equations graphically
- Solving quadratic equations
- Approximating solutions of equations graphically
- Approximating solutions of equations numerically using tables
- Solving equations by finding intersections

P.6 Complex numbers (1 day)

- Complex numbers

- Operations with complex numbers
- Complex conjugates and division
- Complex solutions of quadratic equations

P.7 Solving inequalities algebraically and graphically (1 day)

- Solving absolute value inequalities
- Solving quadratic inequalities
- Approximating solutions to inequalities

Chapter P Test (1 day)

Resources:

MyMathLab online textbook and practice via https://mlm.pearson.com/northamerica/mymathlab/

QR codes in textbook for access to instructional videos, solutions to exercise and Checkpoint exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for video solutions of selected exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for solutions to all odd-numbered exercises and tests.

Unit Modifications for Special Population Students	
Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information

	• Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	• Accommodate with completed study guides to assist with preparation on tests. • Allow more time to complete task, project, or test • Allow students to give responses in a form (oral or written) that's easier for him • Be flexible with time frames, deadlines, or modify assessments • Give alternate or paper copies to replace electronic assignments • Have another student share class notes with the special needs learner. • Higher level reasoning and questioning would have less weight than other assignments. • Receive study skill instructions. • Work with fewer items per page or line and/or materials in a larger print
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:
English Language Arts:
Reading: RST.11-12.4 determine the meaning of symbols, key terms, and other domain specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics
Writing:
Social Studies:
Computer Science and Design Thinking:
Technology Education:
9.3.ST.1 Use technology to acquire, manipulate, analyze and report data.
9.3.ST-SM.4 Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.
9.4.12.O.27 Employ spreadsheet applications to organize and manipulate data.
Life Literacies and Key Skills:
Financial Literacy:
Science:

Integration of 21st Century Skills

Indicators: From the Partnership for 21st Century Skills (P21, the deeper learning competencies and skills for 21st century learning in this unit include:

- Critical thinking and problem solving
- Communication

Unit 2: Functions and Graphs
Unit Description: Students will begin the study of functions that will continue throughout the course. Students will use graphs and the notation studied in the summer assignment to describe the functions. Students will become more familiar with the use of technology which will aid in their studies of later topics and the more in-depth exploration of functions.
Unit Duration: 20 days
Desired Results
Standard(s): **A-CED.A** **A-REI.D** Represent and solve equation and inequalities graphically **F-IF.A** Understand the concept of a function and use function notation. **F-IF.C** Analyze functions using different representations. **F-BF.A** Build a function that models a relationship between two quantities **F-BF.B** Build new functions from existing functions. **G-CO.A** experiment with transformations in the plane **S-ID.B** summarize, represent, and interpret data on two categorical and quantitative variables **S-ID.C** Interpret linear models.
Indicators: **A-CED.A.1** create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions **A-CED.A.2** create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales **A-CED.A.3** represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context **A-CED.A.4** rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations **A-REI.D.10** 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). **F-IF.A.1** 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.A.2** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. **F-IF.C.7a, 7b** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ c. Graph linear and quadratic functions and show intercepts, maxima, and minima. d. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

F-IF.C.8a write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function

a. use the process of factoring and completing the square and quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context

F-IF.C.9 compare properties of two functions each represented in a different way (algebraically, graphically, numerically and tables, or by verbal descriptions).

F-BF.A.1a, 1b, 1c Write a function that describes a relationship between two quantities.★

a. Determine an explicit expression, a recursive process, or steps for calculation from a context.

b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.*

c. Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*

F-BF.B.3 identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x+k) for specific values of k (both positive and negative); find the value of k given graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them

F-BF.B.4a, 4b, 4c,4d Find inverse functions.

a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. *For example,* $f(x) = 2x^3$ *or* $f(x) = (x+1)/(x–1)$ *for* $x \neq 1$.

b. Verify by composition that one function is the inverse of another.

c. Read values of an inverse function from a graph or a table, given that the function has an inverse.

d. produce an invertible function from a non-invertible function by restricting the domain

G-CO.A.4 develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments

S-ID.B.6a, 6b, 6c represent data on two quantitative variables on a scatter plot, and describe how the variables are related

a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models
b. informally assess the fit of a function by plotting and analyzing residuals
c. fit a linear function for a scatter plot that suggests a linear association

S-ID.C.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data

S-ID.C.8 compute using technology and interpret the correlation coefficient of a linear fit

Understandings:

Students will understand that…

Many real-world situations can be modeled using functions and graphs. The skills accumulated through the study of algebra and geometry can be used to better understand these functions and use them to make predictions.

Students will be able to…

- Model and solve real-world problems with functions, graphs, tables and equations.
- Identify grapher failure and hidden behaviors using technology
- Identify and describe the 12 basic functions and their properties
- Create composite functions using two or more different functions using basic combination operations (addition, subtraction, multiplication and division); as well as function composition, such as f(g(x)) or g(f(x)).
- Describe the parametric relations and inverses

Essential Questions:

- How can functions be used to model and solve real-world problems?
- How can you determine grapher failure or hidden behaviors using technology?
- What are the 12 basic functions and their properties?
- How can you construct/define a new function built from two or more functions? How do their properties change (eg. Domain, range, continuity, etc.)?
- What are parametric relations and inverse functions?
- How do graphical transformations affect the equations of the functions?
- How can you choose an appropriate function to model a given data set and situation to achieve the best fit?

• Describe, using interval notation, domain and range; intervals of increasing, decreasing and constant changes in f(x) • Differentiate between graphical transformations and function representations to distinguish such transformations • Model by choosing an appropriate function to represent the behavior being presented.	

Assessment Evidence

Performance Tasks:	**Other Evidence:**
Checkpoints Homework MyMathLab assignments Unit Quiz Mid-Chapter checkpoint(s) Exit/Admit Tickets	MyMathLab remediation Skill Refresher Review and Refresh exercises Vocabulary concept check Study Strategies Algebra Help

Benchmarks:
Chapter 1 Test
Performance Task Chapter 1

Learning Plan

Learning Activities:

1.1 Modeling and equation solving (2-3 days)

- Numerical, algebraic, graphical models
- The zero-factor property
- Problem solving
- Grapher failure and hidden behavior
- A word about proof

1.2 Functions and their properties (2-3 days)

- Function definition and notation
- Domain and range
- Continuity
- Increasing and decreasing functions
- Boundedness
- Local and absolute extrema
- Asymptotes
- End behavior
- Testing for functions with mapping diagrams, tables and algebraically

- Finding the zeros of a function.
- Finding symmetry of a function and using symmetry to graph
- Even/odd functions.

1.3 Twelve basic functions (2 days)

- Twelve basic functions
- Analyzing functions graphically
- Identify and graph linear, quadratic, cubic, square root, and reciprocal functions.
- Identify and graph step and piecewise functions

Mid-chapter checkpoint (1.1-1.3) (1 day)

1.4 Building functions from functions (2 days)

- Combining functions algebraically: add, subtract, multiply and divide with functions.
- Evaluating the difference quotient.
- Find compositions of functions.
- Find the domain of compositions.
- Relations and implicitly defined functions

1.5 Parametric relations and inverses (2 days)

- Relations defined parametrically
- Inverse relations and inverse functions
- Find the inverse of a function.
- Verify inverse functions.
- Graph a function and its inverse.

Mid-chapter checkpoint (1.4-1.5) (1 day)

1.6 Graphical transformations (2 days)

- Transform graphs of parent functions
- Vertical and horizontal translations
- Reflections across axes
- Vertical and horizontal stretches and shrinks
- Combining transformations

1.7 Modeling with functions (1 day)

- Functions from formulas, graphs, verbal descriptions, and data

Chapter 1 Review (1 Day)

Chapter 1 Test (1 Day)

Resources:

MyMathLab online textbook and practice via https://mlm.pearson.com/northamerica/mymathlab/

QR codes in textbook for access to instructional videos, solutions to exercise and Checkpoint exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for video solutions of selected exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for solutions to all odd-numbered exercises and tests.

Unit Modifications for Special Population Students	
Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	• Accommodate with completed study guides to assist with preparation on tests. • Allow more time to complete task, project, or test • Allow students to give responses in a form (oral or written) that's easier for him • Be flexible with time frames, deadlines, or modify assessments • Give alternate or paper copies to replace electronic assignments • Have another student share class notes with the special needs learner. • Higher level reasoning and questioning would have less weight than other assignments. • Receive study skill instructions. • Work with fewer items per page or line and/or materials in a larger print
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:
English Language Arts:

Reading:
RST .11-12.4 determine the meaning of symbols, key terms, and other domain specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics,
RST.11-12.1 accurately site strong and thorough evidence from the text to support analysis of science and technical text, attending to precise details for explanations or descriptions,
RST.11-12.7 integrate and evaluate multiple sources of information presented in diverse formats and media, for example quantitative data, video, multimedia, in order to address a question or solve a problem,
RST.11-12.5 analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas

Writing:
WHST.11-12.1.C Write arguments focused on discipline-specific content. Use transitions to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
WHST.11-12.4 Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience.

Social Studies:
Computer Science and Design Thinking:
8.1.8.DA.4 Transform data to remove errors and improve the accuracy of the data for analysis.
8.1.8.DA.5 Test, analyze, and refine computational models
Technology Education:
9.3.ST.1 Use technology to acquire, manipulate, analyze and report data.
9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems
9.3.ST-SM.4 Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.
9.4.12.O.17 Employ critical thinking skills, for example, analyze, synthesize, and evaluate, independently and in teams to solve problems and make decisions.
9.4.12.O.27 Employ spreadsheet applications to organize and manipulate data.
Life Literacies and Key Skills:
9.4.12.IML.3 Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions
Financial Literacy:
Science:
HS-PS1-5 Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.
HS-PS1-7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
HS-PS1-8 Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
HS-PS1-4 Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

Integration of 21st Century Skills

Indicators: From the Partnership for 21st Century Skills (P21, the deeper learning competencies and skills for 21st century learning in this unit include:

- Critical thinking and problem solving
- Communication
- Collaboration

Unit 3: Polynomial, Power, and Rational Functions
Unit Description: Unit 3 includes a thorough study of the theory of polynomial equations. Students will investigate algebraic methods for finding both real and complex-number solutions of polynomial equations. Students will relate these methods to graphical behavior of polynomial and rational functions. The unit extends these methods to inequalities in one variable. .
Unit Duration: 25 days
Desired Results
Standard(s): **N-RN.A** extend the properties of exponents to rational exponents **N-Q.A** reason quantitatively and use units to solve problems **N-CN.C** use complex numbers in polynomial identities and equations **A-SSE.A** interpret the structure of expressions **A-SSE.B** write expressions in equivalent forms to solve problems **A-APR.A** perform arithmetic operations on polynomials **A-APR.B** understand the relationship between zeros and factors of polynomials **A-APR.C** use polynomial identities to solve problems **A-APR.D** rewrite rational expressions **A-REI.A** understand solving equations as a process of reasoning and explain the reasoning **A-REI.D** represent and solid equations and inequalities graphically **F-IF.B** interpret functions that arise in applications in terms of the context **F-IF.C** analyze functions using different representations **F-BF.A** build a function that models of relationship between two quantities **F-BF.B** build new functions from existing functions **F-LE.A** construct and compare linear, quadratic, and exponential models and solve problems **S-ID.B** summarize, represent, and interpret data on two categorical and quantitative variables **S-ID.C** recognize possible associations and trends in the data
Indicators: **N-RN.A.1** Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. **N-RN.A.2** rewrite expressions involving radicals and rational exponents using properties of exponents **N-Q.A.1** use units as a way to understand problems and to guide the solution of multistep problems: shoes and interpret units consistently in formulas; Choose and interpret the scale and the origin in graphs and data displays **N-Q.A.2** define appropriate quantities for the purpose of descriptive modeling **N-Q.A.3** choose a level of accuracy appropriate to limitations on measurement when reporting quantities **N-CN.C.8** extend polynomial identities to the complex numbers **N-CN.C.9** Know the Fundamental Theorem of Algebra; Show that it is true for quadratic polynomials **A-SSE.A.1a** interpret expressions that represent a quantity in terms of its context* a. interpret parts of an expression, such as terms, factors, and coefficients **A-SSE.A.2** use the structure of an expression to identify ways to rewrite it **A-SSE.B.3a, 3b** Choose and produce and equivalent form of an expression to reveal and explain properties of the quantity represented by the expression* a. factor a quadratic expression to reveal the zeros of the function it defines b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines **A-APR.A.1** understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; Add, subtract, and multiply polynomials **A-APR.B.2** Know and apply the Remainder Theorem: for a polynomial p(x) and a number a, the remainder on division by (x – a) is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x) **A-APR.B.3** identify zeros of polynomials when suitable factorizations are available and use the zeros to construct a rough graph of the function defined by the polynomial **A-APR.C.4** prove polynomial identities and use them to describe numerical relationships

A-APR.D.6 rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), x, q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or for the more complicated examples, a computer algebra system
A-APR.D.7 understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a non-zero rational expression; Add, subtract, multiply, and divide rational expressions
A-REI.A.1 explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method
A-REI.A.2 solve simple rational and radical equations in one variable and give examples showing how extraneous solutions may arise
A-REI.D.10 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 explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intercept are the solutions of the equation f(x) = g(x); Find the solutions approximately
F-IF.B.4 for a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graph showing key features given a verbal description of the relationship. Key features include intercepts; Intervals where the function is increasing, decreasing, positive, or negative; Relative maximums and minimums; Symmetries; End behavior; And periodicity*
F-IF.B.5 relate the domain of a function to its graph and where applicable, to the quantitative relationship it describes
F-IF.B.6 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.7a, 7b, 7c, 7d Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★

a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.

F-IF.C.8a write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function

a. use the process of factoring and completing the square and quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context

F-BF.A.1a Write a function that describes a relationship between two quantities.★

a. Determine an explicit expression, a recursive process, or steps for calculation from a context.

F-BF.B.3 identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x+k) for specific values of k (both positive and negative); find the value of k given graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them
F-BF.B.4c, 4d find inverse functions

c. Read values of an inverse function from a graph or a table, given that the function has an inverse
d. Produce an invertible function from a non-invertible function by restricting the domain

F-LE.A.1a, 1b distinguish between situations that can be modeled with linear functions and with exponential functions

a. Prove that a linear function grows by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals
b. recognize situations in which one quantity changes at a constant rate per unit interval relative to another

S-ID.B.6a, 6brepresent data on two quantitative variables on a scatter plot, and describe how the variables are related

a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models
b. informally assess the fit of a function by plotting and analyzing residuals

S-ID.C.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data
S-ID.C.8 compute using technology and interpret the correlation coefficient of a linear fit
S-ID.C.9 distinguish between correlation and causation

Understandings: *Students will understand that…*	**Essential Questions:**
Many real-world problems can be modeled and solved using polynomial and power functions. The graphical behavior of a function can be described and predicted using algebra. *Students will be able to…* • Identify and use Linear, Quadratic, Polynomial and Power Functions and modeling • Find an algebraic model for a data set and describe the correlation between the two • Use technology to find a regression model for a data set • Apply reasoning and algebraic models for various applications • Identify and use power functions to help specify the proportional relationships of geometry, chemistry and physics applications • Use higher degree polynomial functions to model behavior • Describe and understand the end behavior of a polynomial function by degree • Find the zeros of polynomial functions • Introduction to the Intermediate Value Theorem • Use long division and synthetic division to help find the zeros of higher degree polynomial functions • Use and understand the Remainder Theorem and Rational Zeros Theorem; Use the FTA and the Linear Factorization Theorems to find complex zeros of higher degree polynomials; use the Complex Conjugate Zeros Theorem • Graph, by hand and with technology, rational functions • Describe the symmetry, end behavior, increasing and decreasing behaviors and continuity of; describe and find asymptotes of rational functions • Introduction to the idea of a limit used in Calculus	• What are the differences between linear and quadratic equations and their graphs? • How can linear and quadratic functions be used to model real-world problems? • How can real-world problems be modeled and solved using power functions? Using Rational functions? • What is the Fundamental Theorem of Algebra and how are complex solutions related to it? • What are the characteristics of a rational function and how are they used to graph it? By hand? With a grapher/technology? • How can you distinguish between higher degree polynomials? How can you compare and contrast end behaviors, turning points, zeros and factors to determine/classify higher degree polynomials? • What is the Intermediate Value Theorem and it's importance or relevance to polynomials and Implication for Calculus? • What methods can be used to factor higher degree polynomials? How do these factors help determine the behaviors of the graph and find intercepts? • What does it mean to have an extraneous solution when solving a rational equation? • How can you extend the idea and purpose of graphing a polynomial or rational function to that of an inequality? How do you use interval notation to describe the solution set to the inequality?

• Solve rational equations with and without extraneous solutions • Solve rational, polynomial and radical inequalities algebraically and graphically, using interval notation to describe solution set	

Assessment Evidence	
Performance Tasks: Checkpoints Homework MyMathLab assignments Unit Quiz Mid-Chapter checkpoint(s) Exit/Admit Tickets	**Performance Tasks:** MyMathLab remediation Skill Refresher Review and Refresh exercises Vocabulary concept check Study Strategies Algebra Help
Benchmarks: Chapter 2 Tests (2) Performance Task Chapter 2	

Learning Plan

Learning Activities:

2.1 Linear and quadratic functions and modeling (3 days)
- Polynomial and linear functions and their graphs
- Average rate of change
- Association, correlation, and linear modeling
- Quadratic functions and their graphs
- Applications of quadratic functions
- Graphical transformations

2.2 Modeling with power functions (2 days)
- Power functions and variation
- Monomial functions and their graphs
- Graphs of power functions
- Modeling with power functions

2.3 Polynomial functions of higher degree with modeling (2 days)
- Graphs of polynomial functions
- End behavior and zeros of polynomial functions
- Intermediate Value Theorem
- Modeling of polynomial functions

Mid-chapter checkpoint (2.1-2.3) (1 day)

A.2 Polynomials and factoring review (1 day)
- Adding, subtracting, and multiplying polynomials including special products
- Factoring polynomials using special products and grouping

2.4 Real zeros of polynomial functions (3 days)
- Long division and the Division Algorithm
- Remainder and Factor Theorems
- Synthetic division

- Rational Zeros Theorem
- Upper and lower bounds

2.5 Complex zeros and Fundamental Theorem of Algebra (2 days)

- Complex Conjugate Zeros
- Factoring with real number coefficients

Chapter 2 review (1 day)
Chapter 2 Test *(2.1-2.5)* (1 day)

2.6 Graphs of rational functions (3 days)

- Rational functions
- Transformations of the reciprocal function
- Limits and asymptotes
- Analyzing graphs of rational functions
- Transformations of rational functions

2.7 Solving equations in one variable (1 day)

- Solving rational equations including extraneous solutions and applications

A.3 Fractional expressions review (1 day)

- Algebraic expressions and their domains
- Reducing rational expressions
- Compound rational expressions

2.8 Solving inequalities in one variable (1 day)

- Polynomial, rational, and other inequalities and applications

Chapter 2 review (1 day)
Chapter 2 Test *(2.6-2.8)* (1 day)

Resources:

MyMathLab online textbook and practice via https://mlm.pearson.com/northamerica/mymathlab/

QR codes in textbook for access to instructional videos, solutions to exercise and Checkpoint exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for video solutions of selected exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for solutions to all odd-numbered exercises and tests.

Unit Modifications for Special Population Students	
Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	• Accommodate with completed study guides to assist with preparation on tests. • Allow more time to complete task, project, or test • Allow students to give responses in a form (oral or written) that's easier for him • Be flexible with time frames, deadlines, or modify assessments • Give alternate or paper copies to replace electronic assignments • Have another student share class notes with the special needs learner. • Higher level reasoning and questioning would have less weight than other assignments. • Receive study skill instructions. • Work with fewer items per page or line and/or materials in a larger print
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:
English Language Arts:
Reading:
RST .11-12.4 determine the meaning of symbols, key terms, and other domain specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics,
RST.11-12.1 accurately site strong and thorough evidence from the text to support analysis of science and technical text, attending to precise details for explanations or descriptions,
RST.11-12.8 evaluate the hypothesis, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information,
RST.11-12.5 analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas
Writing:
WHST.11-12.1.C Write arguments focused on discipline-specific content. Use transitions to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
WHST.11-12.4 Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience.
Social Studies:
Computer Science and Design Thinking:
8.1.8.DA.4 Transform data to remove errors and improve the accuracy of the data for analysis.
8.1.8.DA.5 Test, analyze, and refine computational models
8.1.12.DA.5 Create data visualizations for large data sets to summarize, communicate and support different interpretations of real-world phenomena.
8.1.12.DA.6 Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
Technology Education:
9.3.ST.1 Use technology to acquire, manipulate, analyze and report data.
9.3.ST-SM.2 Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems
9.3.ST-SM.4 Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.
9.4.12.O.17 Employ critical thinking skills, for example, analyze, synthesize, and evaluate, independently and in teams to solve problems and make decisions.
9.4.12.O.27 Employ spreadsheet applications to organize and manipulate data.
Life Literacies and Key Skills: 9.4.12.IML.3 Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions
Financial Literacy:
Science:
HS-PS1-5 Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.
HS-PS1-7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
HS-PS1-8 Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
HS-PS1-4 Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

Integration of 21st Century Skills

Indicators: From the Partnership for 21st Century Skills (P21), the deeper learning competencies and skills for 21st century learning in this unit include:

- Critical thinking and problem solving
- Communication
- Collaboration

Unit 4: Exponential, Logistic, and Logarithmic Functions

Unit Description: Students will study three interrelated families of functions: exponential, logistic, and logarithmic. The functions studied in the previous unit are considered algebraic functions and can be generated by adding, subtracting, multiplying, and dividing constants and an independent variable, and raising expressions to integer powers and extracting roots. This unit will explore transcendental functions, which go beyond, or transcend these algebraic operations. These functions can be used to model growth and decay. Students will apply their knowledge of these functions to solve real-world problems involving radioactive decay, population growth, earthquake intensity, the pH acidity scale, and the decibel measurement of sound.

Unit Duration: 20

Desired Results

Standard(s):

N-RN.A extend the properties of exponents to rational exponents

N-Q.A reason quantitatively and use units to solve problems

A-SSE.A interpret the structure of expressions

A-SSE.B write expressions in equivalent forms to solve problems

A-CED.A create equations that describe numbers or relationships

F-IF.B interpret functions that arise in applications in terms of the context

F-IF.C analyze functions using different representations

F-BF.B build new functions from existing functions

F-LE.A construct and compare linear, quadratic, and exponential models and solve problems

F-LE.B interpret expressions for functions in terms of the situation they model

Indicators:

N-RN.A.1 Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.

N-RN.A.2 rewrite expressions involving radicals and rational exponents using properties of exponents

N-Q.A.1 use units as a way to understand problems and to guide the solution of multistep problems: shoes and interpret units consistently in formulas; Choose and interpret the scale and the origin in graphs and data displays

N-Q.A.2 define appropriate quantities for the purpose of descriptive modeling

N-Q.A.3 choose a level of accuracy appropriate to limitations on measurement when reporting quantities

A-SSE.A.1a interpret expressions that represent a quantity in terms of its context*

a. interpret parts of an expression, such as terms, factors, and coefficients

A-SSE.A.2 use the structure of an expression to identify ways to rewrite it

A-SSE.B.3a, 3c Choose and produce and equivalent form of an expression to reveal and explain properties of the quantity represented by the expression*

a. factor a quadratic expression to reveal the zeros of the function it defines

c. Use the properties of exponents to transform expressions for exponential functions

A-CED.A.1 understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; Add, subtract, and multiply polynomials

F-IF.B.4 for a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graph showing key features given a verbal description of the relationship. Key features include intercepts; Intervals where the function is increasing, decreasing, positive, or negative; Relative maximums and minimums; Symmetries; End behavior; And periodicity*

F-IF.B.5 relate the domain of a function to its graph and where applicable, to the quantitative relationship it describes*

F-IF.C.7e Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★

e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline and amplitude.

F-IF.C.8b write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function

b. Use the properties of exponents to interpret expressions for exponential functions

F-IF.C.9 compare properties of two functions each represented in a different way, algebraically, graphically, numerically and tables or by verbal descriptions

F-BF.B.3 identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x+k) for specific values of k (both positive and negative); find the value of k given graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them

F-BF.B.5 understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents

F-LE.A.1a, 1c distinguish between situations that can be modeled with linear functions and with exponential functions

a. Prove that a linear function grows by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals

c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another

F-LE.A.2 construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs, include reading these from a table

F-LE.A.3 Observe using graphs and tables at a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or more generally as a polynomial function

F-LE.A.4 for exponential models, express as a logarithm the solution to $ab^{ct} = d$, where a, c and d are numbers and the base b is 2, 10, or *e*; Evaluate the logarithm using technology

F-LE.B.5 interpret the parameters in a linear or exponential function in terms of a context

Understandings:	Essential Questions:
Students will understand that… Many real-world problems can be modeled using the functions studied in this unit. The functions studied in this unit can be used to create models, analyze graphs and data, and solve problems. *Students will be able to…* • Recognize exponential functions and their graphs. • Recognize and describe the natural base *e*. • Recognize logistic functions and their graphs. • Apply these functions to population growth and decay models. • Use and apply the properties of logarithms and to simplify and solve exponential and logarithm expressions and equations. • Use exponential functions to calculate compound interest simple interest annuities and other various financial applications	• What are the characteristics of exponential functions and their graphs? • What is the natural base *e*? And what is significant about it? • What is a logistic function? What does this graph look like? What are some applications of logistic functions? • How are logistic and exponential functions applied to population models? • What are the properties of logarithms and how are they used to solve problems? • How are exponential functions used to calculate compound interest and other financial formulas?

Assessment Evidence

Performance Tasks:	**Performance Tasks:**
Checkpoints Homework MyMathLab assignments Unit Quiz Mid-Chapter Checkpoint(s) Exit/Admit Tickets	MyMathLab remediation Skill Refresher Review and Refresh exercises Vocabulary concept check Study Strategies Algebra Help

Benchmarks:
Chapter 3 Test
Performance Task Chapter 3

Learning Plan

Learning Activities:

A.1 Radicals and rational exponents review (1 day)
- Radicals
- Simplifying radical expressions
- Rationalizing the denominator
- Rational exponents

3.1 Exponential and logistic functions (2 days)
- Exponential functions and their graphs
- The Natural Base e
- Logistic functions and their graphs
- Population models

3.2 Exponential and logistic modeling (2 days)
- Constant percentage rate and exponential functions
- Exponential growth and decay models
- Using regression to model population
- Other logistic models

Mid-chapter checkpoint (3.1-3.2) (1 day)

3.3 Logarithmic functions and their graphs (2 days)
- Inverses of exponential functions
- Common logarithms- base 10
- Natural logarithms- base e
- Graphs of logarithmic functions
- Measuring sound using decibels

3.4 Properties of logarithmic functions (3 days)
- Properties of logarithms
- Change of base
- Graphs of logarithmic functions with base b
- Re-expressing data

3.5 Equation solving and modeling (2 days)
- Solving exponential equations

- Solving logarithmic equations
- Orders of magnitude and logarithmic models
- Newton's Law of Cooling
- Logarithmic re-expression

Mid-chapter checkpoint (3.3-3.5) (1 day)

3.6 Mathematics of finance (2 days)
- Simple and compound interest
- Interest compounded K times per year
- Interest compounded continuously
- Annual percentage yield
- Annuities- future value
- Loans and mortgages- present value

Chapter 3 review (1 day)
Chapter 3 Test (1 day)

Resources:

MyMathLab online textbook and practice via https://mlm.pearson.com/northamerica/mymathlab/

QR codes in textbook for access to instructional videos, solutions to exercise and Checkpoint exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for video solutions of selected exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for solutions to all odd-numbered exercises and tests.

Unit Modifications for Special Population Students	
Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords

	• Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	• Accommodate with completed study guides to assist with preparation on tests. • Allow more time to complete task, project, or test • Allow students to give responses in a form (oral or written) that's easier for him • Be flexible with time frames, deadlines, or modify assessments • Give alternate or paper copies to replace electronic assignments • Have another student share class notes with the special needs learner. • Higher level reasoning and questioning would have less weight than other assignments. • Receive study skill instructions. • Work with fewer items per page or line and/or materials in a larger print
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:
English Language Arts:

Reading:

RST .11-12.4 determine the meaning of symbols, key terms, and other domain specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics,
RST.11-12.1 accurately site strong and thorough evidence from the text to support analysis of science and technical text, attending to precise details for explanations or descriptions,
RST.11-12.7 integrate and evaluate multiple sources of information presented in diverse formats and media, for example quantitative data, video, multimedia, in order to address a question or solve a problem,
RST.11-12.8 evaluate the hypothesis, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information

Writing:

WHST.11-12.1.C Write arguments focused on discipline-specific content. Use transitions to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
WHST.11-12.4 Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience.

Social Studies:
6.1.12.EconNE.6.a Analyze the impact of money, investment, credit, savings, debt and financial institutions on the development of the nation and the lives of individuals

Computer Science and Design Thinking:
8.1.12.DA.5 Create data visualizations for large data sets to summarize, communicate and support different interpretations of real-world phenomena.
8.1.12.DA.6 Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.

Technology Education:
9.3.ST.1 Use technology to acquire, manipulate, analyze and report data.
9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems
9.3.ST-SM.2 Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems
9.3.ST-SM.4 Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.
9.4.12.O.17 Employ critical thinking skills, for example, analyze, synthesize, and evaluate, independently and in teams to solve problems and make decisions.

Life Literacies and Key Skills:

9.4.12.CT.2 Explain the potential benefits of collaborating to enhance critical thinking and problem solving
9.4.12.IML.3 Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions
Financial Literacy:
9.1.12.CDM.6 Compute and assess the accumulating effect of interest paid over time when using a variety of sources of credit. (student loans, credit cards, auto loans, mortgages, etc)
Science:
HS-PS1-5 Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.
HS-PS1-7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
HS-PS1-8 Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
HS-PS1-4 Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.
HS-PS2-2 Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.
HS-PS2-4 Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.
HS-PS2-1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

Integration of 21st Century Skills

Indicators: From the Partnership for 21st Century Skills (P21), the deeper learning competencies and skills for 21st century learning in this unit include:

- Critical thinking and problem solving
- Creativity and innovation
- Communication
- Collaboration

Unit 5: Trigonometric Functions
Unit Description: In ancient times the study of the trigonometric functions arose from the consideration of ratios and right triangles. As the understanding of our world progressed from a flat Earth to a sphere, trigonometry became instrumental to understanding circular and periodic behavior. The application of trigonometry to the study of circular motion had led to applications in harmonic motion and waves and eventually electrical current and modern telecommunication. Our studies in this unit will include the basic properties of the six trigonometric functions and the unit circle. We will use these properties to solve triangles and various real-world problems.
Unit Duration: 20 days
Desired Results
Standard(s): **A-REI.D** represent and solve equations and inequalities graphically **F-IF.B** interpret functions that arise in applications in terms of the context **F-IF.C** analyze functions using different representations **F-BF.A** build a function that models a relationship between two quantities **F-BF.B** build new functions from existing functions **F-TF.A** extend the domain of trigonometric functions using the unit circle **F-TF.B** model periodic phenomena with trigonometric functions **F-TF.C** prove and apply trigonometric identities **G-CO.A** experiment with transformations in the plane **G-SRT.B** proof theorems involving similarity **G-SRT.C** define trigonometric ratios and solve problems involving right triangles **G-SRT.D** apply trigonometry to general triangles **G-C.B** find arc lengths and areas of sectors of circles
Indicators: **A-REI.D.10** 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). **F-IF.B4** for a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graph showing key features given a verbal description of the relationship. Key features include intercepts; Intervals where the function is increasing, decreasing, positive, or negative; Relative maximums and minimums; Symmetries; End behavior; And periodicity* **F-IF.C.7e** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ a. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline and amplitude. **F-IF.C.9** compare properties of two functions each represented in a different way, algebraically, graphically, numerically and tables or by verbal descriptions

F-BF.A.1a, 1b, 1c Write a function that describes a relationship between two quantities.★

a. Determine an explicit expression, a recursive process, or steps for calculation from a context.
b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.*
c. Compose functions.

F-BF.B.3 identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x+k) for specific values of k (both positive and negative); find the value of k given graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them

F-TF.A.1 understand Radian measure of an angle as the length of the arc on the unit circle subtended by the angle

F-TF.A.2 explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as Radian measures of angles traversed counterclockwise around the unit circle

F-TF.A.3 use special triangles to determine geometrically the values of sine, cosine, and tangent for π/3, π/4, π/6, and use the unit circle to express the values of sine, cosine, and tangent for π – x, π + x, 2π – x, in terms of their values for x, where x is any real number

F-TF.A.4 use the unit circle to explain symmetry, odd and even, and periodicityof trigonometric functions

F-TF.B.5 choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline*

F-TF.B.6 understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed

F-TF.B.7 use inverse functions to solve trigonometric equations that arise in modeling context; Evaluate the solutions using technology, and interpret them in terms of context*

F-TF.C.8 prove the Pythagorean identity $\sin^2\Theta + \cos^2\Theta = 1$, and use it to find sinϴ cosϴ, or tanϴ, given sinϴ, cosϴ, or tanϴ and the quadrant of the angle

F-TF.C.9 prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems

G-CO.A.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along the line, and distance around a circular arc

G-SRT.B.5 use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures

G-SRT.C.6 understand that by similarity, side ratios and right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles

G-SRT.C.7 explain and use the relationship between the sine and cosine of complementary angles

G-SRT.C.8 use trigonometric ratios and the Pythagorean theorem to solve right triangles in applied problems*

G-SRT.D.9 derive the formula A = 1/2 ab(sinC) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side

G-C.B.5 derive the fact that the length of the arc intercepted by an angle is proportional to the radius, and to find the Radian measure of the angle as the constant of proportionality; Derive the formula for the area of a sector

Understandings:

Students will understand that…

The angles in right triangles can be described using ratios of sides. Trigonometry can be used to solve many real-world problems including applications in physics and architecture.

Students will be able to…

- Describe and measure angles in both degrees and radians.
- Use properties of radians to calculate arc length and angular and linear velocity
- use trigonometric relationships in right triangles to solve the triangles
- apply and use the unit circle approach to calculate trigonometric ratios for real numbers
- identify and use properties of trigonometric functions to graph sinusoidal curves

Essential Questions:

- What is a radian and how is it related to the degree measurement of angles?
- How can Radian measurement be used to calculate linear and angular velocity?
- What are the basic trigonometric ratios and how are they used to solve right triangles?
- How can the unit circle be used to calculate trigonometric ratios?
- How do the properties of trigonometric functions affect sinusoidal graphs?
- How are inverse trigonometric functions used to solve equations?
- How are the properties of trigonometry used to solve real world problems?

• understand and use the inverse trigonometric functions to solve for unknown angle measures • identify trigonometric properties to solve real world problems	

Assessment Evidence	
Performance Tasks: Checkpoints Homework MyMathLab assignments Unit Quiz Mid-Chapter checkpoint(s) Exit/Admit Tickets	**Performance Tasks:** MyMathLab remediation Skill Refresher Review and Refresh exercises Vocabulary concept check Study Strategies Algebra Help
Benchmarks: Chapter 4 Test Performance Task Chapter 4	

Learning Plan

Learning Activities:

4.1 Angles and their measures (2 days)

- Problem of angular measure
- Degrees and radians
- Circular arc length
- Angular and linear motion

4.2 Trigonometric functions of acute angles (2 days)

- Right triangle trigonometry
- Two famous triangles
- Evaluating trigonometric functions with a calculator
- Common calculator errors when evaluating trig functions
- Applications of right triangle trigonometry

4.3 Trigonometry extended: the circular functions (2 days)

- Trigonometric functions of any angle
- Trigonometric functions of real numbers
- Periodic functions
- The 16-point Unit Circle

Mid-chapter checkpoint (4.1-4.3) (1 day)

4.4 Graphs of sine and cosine: sinusoids (2 days)

- The basic waves revisited
- Sinusoids and transformations
- Modeling periodic behavior with sinusoids

Graphing review (1 day)
Graphing checkpoint(4.4) (1 day)

4.5 Graphs of tangent, cotangent, secant, and cosecant (1 day)

- The tangent, cotangent, secant, and cosecant functions and their graphs

4.6 Graphs of composite trigonometric functions (1 day)

- Combining trigonometric and algebraic functions
- Sums and differences of sinusoids
- Damped oscillation

Chapter 4 review (1 day)
Chapter 4 Test (4.1-4.6) (2 days – calculator required and no calculator permitted)

4.7 Inverse trigonometric functions (2 days)

- Inverse sine, cosine, and tangent functions
- Composing trigonometric and inverse trigonometric functions
- Applications of inverse trigonometric functions

4.8 Solving problems with trigonometry (1 day)

- More right triangle problems
- Simple harmonic motion

Resources:

MyMathLab online textbook and practice via https://mlm.pearson.com/northamerica/mymathlab/

QR codes in textbook for access to instructional videos, solutions to exercise and Checkpoint exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for video solutions of selected exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for solutions to all odd-numbered exercises and tests.

Unit Modifications for Special Population Students	
Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments

	• Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	• Accommodate with completed study guides to assist with preparation on tests. • Allow more time to complete task, project, or test • Allow students to give responses in a form (oral or written) that's easier for him • Be flexible with time frames, deadlines, or modify assessments • Give alternate or paper copies to replace electronic assignments • Have another student share class notes with the special needs learner. • Higher level reasoning and questioning would have less weight than other assignments. • Receive study skill instructions. • Work with fewer items per page or line and/or materials in a larger print
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:

English Language Arts:

Reading: RST .11-12.4 determine the meaning of symbols, key terms, and other domain specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics

Writing:

WHST.11-12.1.C Write arguments focused on discipline-specific content. Use transitions to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

WHST.11-12.4 Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience.

Social Studies:

Computer Science and Design Thinking:

Technology Education:

9.3.ST-SM.4 Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.

9.4.12.O.17 Employ critical thinking skills, for example, analyze, synthesize, and evaluate, independently and in teams to solve problems and make decisions.

9.4.12.O.27 Employ spreadsheet applications to organize and manipulate data.

Life Literacies and Key Skills:

Financial Literacy:

Science:

Integration of 21st Century Skills

Indicators: From the Partnership for 21st Century Skills (P21), the deeper learning competencies and skills for 21st century learning in this unit include:

- Critical thinking and problem solving
- Creativity and innovation
- Communication
- Collaboration

Unit 6: Analytic Trigonometry

Unit Description: This unit will focus more on connections between trigonometric functions emphasizing theory and proof. Students will prove various identities and use established identities to rewrite expressions. These skills will be instrumental in simplifying complicated expressions in the future study of Calculus. The unit will also cover the law of sines and the law of cosines to solve triangles.

Unit Duration: 16 days

Desired Results

Standard(s):
A-REI.A understand solving equations as a process of reasoning and explain the reasoning
F-TF.C prove and apply trigonometric identities
G-SRT.D apply trigonometry to general triangles

Indicators:
A-REI.A.1 explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method
F-TF.C.9 prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems
G-SRT.D.10 prove the law of sines and cosines, and use them to solve problems
G-SRT.D.11 understand and apply the law of sines and the law of cosines to find unknown measurements in right and non-right triangles

Understandings:
Students will understand that…

All six trigonometric functions can be connected through many different valid identities. The law of sines and the law of cosines can be applied to solve any triangle.

Students will be able to…

- Identify the basic trigonometric identities and be able to use them to simplify expressions and solve equations
- use basic trigonometric identities to verify more complicated identities
- know the sum and difference identities and be able to use them to verify identities, simplify expressions, and solve equations
- use the double and half angle identities and be able to use them to verify identities, simplify expressions, and solve equations
- identify and use the law of sines and the law of cosines to solve triangles; including calculating the area of oblique triangles

Essential Questions:

- What are the basic trigonometric identities and how are they used to solve equations?
- How can the basic trigonometric identities be used to simplify more complicated expressions?
- What are the sum and difference identities and how are they used to simplify complicated expressions?
- What are the double and half angle identities and how are they used to simplify complicated expressions?
- How are trigonometric identities used in calculus?
- What is the law of sines? What is the law of cosines? How are they used to solve real world problems?
- How can we find the area of oblique triangles?

Assessment Evidence

Performance Tasks:	Performance Tasks:
Checkpoints	MyMathLab remediation
Homework	Skill Refresher
MyMathLab assignments	Review and Refresh exercises
Unit Quiz	Vocabulary concept check
Mid-Chapter checkpoint(s)	Study Strategies
Exit/Admit Tickets	Algebra Help

Benchmarks:
Chapter 5 Test
Performance Task Chapter 5

Learning Plan

Learning Activities:
5.5 The Law of Sines (2 days)
- Deriving the law of sines
- Solving triangles (aas, asa)
- The ambiguous case (ssa)
- Applications

5.6 The Law of Cosines (1 day)
- Deriving the law of cosines
- Solving triangles (sas, sss)
- Triangle area and heron's formula
- Applications

Chapter 4-5 review (4.7-4.8, 5.5-5.6) (1 day)
Chapter 4-5 Test (4.7-4.8, 5.5-5.6) (1 day)

B.1 Logic: An introduction (1 day)
- Statements and compound statements

5.1 Fundamental identities (2 days)
- Trigonometric identities
- Basic, pythagorean, cofunction, and even-odd identities
- Simplifying trigonometric expressions
- Solving basic trigonometric equations

5.2 Proving trigonometric identities (2 days)
- A proof strategy
- Proving identities
- Disproving non-identities
- Identities in calculus

Mid-chapter checkpoint (1 day)

5.3 Sum and difference identities (1 day)
- Cosine of a sum or difference
- Sine of a sum or difference
- Tangent of a sum or difference
- Verifying a sinusoid algebraically

5.4 Multiple-angle identities (1 day)
- Double-angle identities, power-reducing identities, half-angle identities
- Solving trigonometric equations
-

Chapter 5 review (1 day)
Chapter 5 Test (5.1-5.4) (1 day)

Resources:

MyMathLab online textbook and practice via https://mlm.pearson.com/northamerica/mymathlab/

QR codes in textbook for access to instructional videos, solutions to exercise and Checkpoint exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for video solutions of selected exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for solutions to all odd-numbered exercises and tests.

Unit Modifications for Special Population Students	
Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	• Accommodate with completed study guides to assist with preparation on tests. • Allow more time to complete task, project, or test • Allow students to give responses in a form (oral or written) that's easier for him • Be flexible with time frames, deadlines, or modify assessments • Give alternate or paper copies to replace electronic assignments • Have another student share class notes with the special needs learner. • Higher level reasoning and questioning would have less weight than other assignments. • Receive study skill instructions. • Work with fewer items per page or line and/or materials in a larger print

Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:
English Language Arts:

Reading: RST .11-12.4 determine the meaning of symbols, key terms, and other domain specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics, RST.11-12.7 integrate and evaluate multiple sources of information presented in diverse formats and media, for example quantitative data, video, multimedia, in order to address a question or solve a problem

Writing:
WHST.11-12.1.C Write arguments focused on discipline-specific content. Use transitions to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
WHST.11-12.4 Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience.

Social Studies:
Computer Science and Design Thinking:
Technology Education:
9.3.ST.1 Use technology to acquire, manipulate, analyze and report data.
9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems
9.3.ST-SM.2 Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems
9.4.12.O.17 Employ critical thinking skills, for example, analyze, synthesize, and evaluate, independently and in teams to solve problems and make decisions.
Life Literacies and Key Skills: 9.4.12.CT.2 Explain the potential benefits of collaborating to enhance critical thinking and problem solving
Financial Literacy:
Science:

Integration of 21st Century Skills

Indicators: From the Partnership for 21st Century Skills (P21), the deeper learning competencies and skills for 21st century learning in this unit include:

- Critical thinking and problem solving
- Creativity and innovation
- Communication
- Collaboration

Unit 7: Applications of Trigonometry	
Unit Description: This unit will introduce students to vectors in the plane. Students will use the properties of angles and triangles from previous studies to perform vector operations and use vectors to represent quantities such as force and velocity. Students will use parametric equations to model and simulate motion. Polar coordinates will be introduced and used to describe orbital motion.	
Unit Duration: 12 days	
Desired Results	
Standard(s): **N-Q.A** reason quantitatively and use units to solve problems **N-CN.A** perform arithmetic operations with complex numbers **N-CN.B** represent complex numbers and their operations on the complex plane **N-VM.A** represent and model with vector quantities **N-VM.B** perform operations on vectors	
Indicators: **N-Q.A.1** use units as a way to understand problems and to guide the solution of multistep problems; choose and interpret units consistently in formulas; Choose end interpret the scale and the origin in graphs and data displays **N-Q.A.2** define appropriate quantities for the purpose of descriptive modeling **N-CN.A.2** use the relation i^2 = -1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers **N-CN.A.3** find the conjugate of a complex number; Use conjugates defined moduli and quotients of complex numbers **N-CN.B.4** 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 **N-CN.B.5** represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; Use properties of this representation for computation **N-VM.A.1** recognize that the quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes **N-VN.A.2** 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** Solve problems involving velocity and other quantities that can be represented by vectors **N-VM.B.4a, 4b, 4c** add and subtract vectors a. add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes b. given two vectors in magnitude and direction form, determine the magnitude and direction of their sum c. understand vector subtraction v - w as v + (-w), where -w is the additive inverse of w with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise **N-VM.B.5a, 5b** multiply a vector by a scalar a. Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; Perform scalar multiplication component-wise b. compute the magnitude of a scalar multiple cv using $\|cv\| = \|c\|\|v\|$. Compute the direction of cv knowing that when $\|c\|\|v\| \neq 0$, the direction of cv is either along v, (for c>0) or against v, (for c<0)	
Understandings: *Students will understand that…* The skills acquired in the study of geometry and algebra can be applied to analyze and solve complicated problems including motion and force. *Students will be able to…*	**Essential Questions:** • How can two-dimensional vectors be applied to solve real world problems? • How are vector operations used to calculate dot products? • How are angles between vectors calculated? How can one vector be projected onto another? • how can vectors be used to solve work problems?

• Represent two-dimensional vectors and solve real world problems using vectors. • Perform vector operations and calculate dot products. • Calculate angles between vectors and project one vector onto another. • Use vectors to solve work problems. • Represent problems with parametric equations and simulate motion with a grapher. • Convert rectangular coordinates to polar coordinates and vice versa. • Find distance using polar coordinates.	• How can parametric equations be used to represent problems? • How are rectangular coordinates converted to polar coordinates? • How are polar coordinates used to calculate distance?

Assessment Evidence

Performance Tasks:	**Performance Tasks:**
Checkpoints Homework MyMathLab assignments Unit Quiz Mid-Chapter Checkpoint(s) Exit/Admit Tickets	MyMathLab remediation Skill Refresher Review and Refresh exercises Vocabulary concept check Study Strategies Algebra Help

Benchmarks:
Chapter 6 Test
Performance Task Chapter 6

Learning Plan

Learning Activities:

6.1 Vectors in the plane (1 day)

- Two-dimensional vectors
- Vector operations
- Unit vectors
- Direction angles
- Applications of vectors

6.2 Dot product of vectors (1 day)

- The dot product
- Angle between vectors
- Projecting one vector onto another

6.3 Parametric equations and motion (2 days)

- Parametric equations and curves
- Eliminating the parameter
- Lines and line segments
- Simulating motion with a grapher

Mid-chapter checkpoint (6.1-6.3) (1 day)

6.4 Polar coordinates (2 days)

- Polar coordinate system
- Coordinate conversion
- Equation conversion
- Finding distance using polar coordinates

6.5 Graphs of polar equations (2 days)

- Polar curves and parametric curves
- Symmetry of polar graphs
- Analyzing polar graphs
- Rose, Limacon and other polar curves

Chapter 6 review (1 day)
Chapter 6 Test (1 day)

Resources:

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QR codes in textbook for access to instructional videos, solutions to exercise and Checkpoint exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for video solutions of selected exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for solutions to all odd-numbered exercises and tests.

Unit Modifications for Special Population Students	
Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test.

	• Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	• Accommodate with completed study guides to assist with preparation on tests. • Allow more time to complete task, project, or test • Allow students to give responses in a form (oral or written) that's easier for him • Be flexible with time frames, deadlines, or modify assessments • Give alternate or paper copies to replace electronic assignments • Have another student share class notes with the special needs learner. • Higher level reasoning and questioning would have less weight than other assignments. • Receive study skill instructions. • Work with fewer items per page or line and/or materials in a larger print
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:
English Language Arts:
Reading:
Writing:
Social Studies:
Computer Science and Design Thinking:
Technology Education:
9.3.ST.1 Use technology to acquire, manipulate, analyze and report data.,
9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems
9.3.ST-SM.2 Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems
9.4.12.O.17 Employ critical thinking skills, for example, analyze, synthesize, and evaluate, independently and in teams to solve problems and make decisions.
Life Literacies and Key Skills:
Financial Literacy:
Science:
HS-PS1-5 Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.
HS-PS1-7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
HS-PS1-8 Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
HS-PS1-4 Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

Integration of 21st Century Skills

Indicators: From the Partnership for 21st Century Skills (P21), the deeper learning competencies and skills for 21st century learning in this unit include:

- Critical thinking and problem solving
- Communication
- Collaboration

Unit 8: Discrete Mathematics/ Sequences and Series
Unit Description: This unit will explore sequences and series. More specifically, students will study infinite sequences and series and will learn how to find the sum of an infinite sequence or series. These concepts will reinforce the foundation for the rigorous study of integrals in calculus. The appropriate use of the graphing calculator will play a major role in enhancing the students conceptual understanding of these higher-level concepts.
Unit Duration: 8-10 days
Desired Results
Standard(s): **A-SSE.B** write expressions and equivalent forms to solve problems **A-APR.C** use polynomial identities to solve problems **F-IF.A** understand the concept of a function and use function notation **F-BF.A** build a function that models a relationship between two quantities
Indicators: **A-SSE.B.4** do you drive with formula for the sum of a finite geometric series, when the common ratio is not 1, and use the formula to solve problems* **A-APR.C.5 K**now and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined, for example, by Pascal's triangle **F-IF.A.3** recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers **F-BF.A.1a** write a function that describes the relationship between two quantities*. determine an explicit expression, a recursive process, or steps for calculation from a context **F-BF.A.2** right arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms*

Understandings:	**Essential Questions:**
Students will understand that… The application of the concept of limits combined with the study of infinite sequences and series and the sum of an infinite series is the basis of the study of integrals in calculus. *Students will be able to…* • Find the n^{th} term of an arithmetic or geometric sequence • find a formula for the n^{th} term of an arithmetic or geometric sequence • to use and understand summation notation • find the sum of an infinite sequence or series • calculate the sum of a finite sequence using technology	• What is the difference between an arithmetic and geometric sequence? • How do we find the nth term of an arithmetic or geometric sequence? • How is summation notation used to express the sum of an infinite series? • How can the sum of an infinite series be found? • How can we calculate the sum of a finite sequence?

Assessment Evidence

Performance Tasks:	**Performance Tasks:**
Checkpoints Homework MyMathLab assignments Unit Quiz Mid-Chapter checkpoint(s) Exit/Admit Tickets	MyMathLab remediation Skill Refresher Review and Refresh exercises Vocabulary concept check Study Strategies Algebra Help

Benchmarks:
Chapter 9 Test
Performance Task Chapter 9

Learning Plan

Learning Activities:

9.2 Binomial theorem *(optional)* (2 days)
- Powers of binomials
- Pascal's triangle
- Binomial theorem
- Factorial

9.3 Sequences (3 days)
- Infinite, arithmetic, and geometric sequences
- Limits of infinite sequences
- Sequences and technology

9.4 Series (3 days)
- Summation notation
- Sums of arithmetic and geometric sequences
- Infinite series
- Convergence of geometric series

Chapter 9 review (1 day)
Chapter 9 Test (1 day)

Resources:

MyMathLab online textbook and practice via https://mlm.pearson.com/northamerica/mymathlab/

QR codes in textbook for access to instructional videos, solutions to exercise and Checkpoint exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for video solutions of selected exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for solutions to all odd-numbered exercises and tests.

Unit Modifications for Special Population Students

Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning

	• Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	• Accommodate with completed study guides to assist with preparation on tests. • Allow more time to complete task, project, or test • Allow students to give responses in a form (oral or written) that's easier for him • Be flexible with time frames, deadlines, or modify assessments • Give alternate or paper copies to replace electronic assignments • Have another student share class notes with the special needs learner. • Higher level reasoning and questioning would have less weight than other assignments. • Receive study skill instructions. • Work with fewer items per page or line and/or materials in a larger print
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:

English Language Arts:

Reading: RST .11-12.4 determine the meaning of symbols, key terms, and other domain specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics

Writing:

WHST.11-12.1.C Write arguments focused on discipline-specific content. Use transitions to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

WHST.11-12.4 Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience.

Social Studies:

Computer Science and Design Thinking:
Technology Education:
Life Literacies and Key Skills:
Financial Literacy:
9.1.12.CDM.6 Compute and assess the accumulating effect of interest paid over time when using a variety of sources of credit. (student loans, credit cards, auto loans, mortgages, etc)
Science:
HS-PS1-8 Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
HS-PS1-4 Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

Integration of 21st Century Skills

Indicators: From the Partnership for 21st Century Skills (P21), the deeper learning competencies and skills for 21st century learning in this unit include:

- Critical thinking and problem solving
- Creativity and innovation
- Communication
- Collaboration

Unit 9: An Introduction to Calculus: Limits, Derivatives, and Integrals	
Unit Description: This unit will introduce the concept of a limit. The concept will be explored further in the application of the tangent line problem, area problems, and an introduction to derivatives and integrals. Applications will include velocity and calculating the area under a curve. the derivative of a function *f(x)* will be introduced as $\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$. This rigorous approach will require very strong algebra skills to these students and will lay the foundation for much of the study of calculus. This unit will also provide a rigorous introduction to the concept of the integral as the sum of an infinite series. The definite integral will be defined using the following rigorous formula: $\int_a^b f(x)dx = \lim_{n\to\infty}\sum_{i=1}^{n} f(x_i)\Delta x$. The unit will also include the study of one-sided limits and continuous and noncontinuous functions.	
Unit Duration: 14 days	
Desired Results	
Standard(s): **F-IF.B** interpret functions that arise in applications in terms of the context	
Indicators: **F-IF.B.6** 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*	
Understandings: *Students will understand that…* The concept of a limit is the foundation for the study of calculus. Most of the mathematics and algebra students have studied up to this point are over two-thousand years old. Calculus by comparison is a rather recent and groundbreaking development having existed for only about 300 years. The study of calculus can be used to solve many important problems that otherwise would be impossible to analyze. *Students will be able to…* • Articulate the meaning of the derivative and the integral both algebraically and graphically • calculate numeric derivatives and definite integrals • use derivatives and integrals to solve real world problems including velocity and area • derive general formulas for derivatives and integrals for polynomial functions • calculate limits of functions, including one-sided limits	**Essential Questions:** • What is a derivative and how can it be calculated using a graphing calculator? • How are derivatives and integrals applied to velocity and area problems? • What is the power rule and how is it used to calculate the derivative of a polynomial function? • What are the techniques for calculating limits and how are they used? • What is meant by a continuous function both algebraically and graphically?

• determine if a function is continuous over a given interval or at a given point	

Assessment Evidence

Performance Tasks:	**Performance Tasks:**
Checkpoints	MyMathLab remediation
Homework	Skill Refresher
MyMathLab assignments	Review and Refresh exercises
Unit Quiz	Vocabulary concept check
Mid-Chapter checkpoint	Study Strategies
Exit/Admit Tickets	Algebra Help

Benchmarks:
Chapter 11 Test
Performance Task Chapter 11

Learning Plan

Learning Activities: ***(optional if time allows)***

11.1 Limits and motion: Tangent problem *(optional)* (2 days)

- Average and instantaneous velocity
- Limits revisited
- The connection to tangent lines
- The derivative

11.2 Limits and motion: Area problem *(optional)* (2 days)

- Distance from a constant velocity or from a changing velocity
- Limits at infinity
- Connection to area
- The definite integral

11.3 More on limits *(optional)* (2 days)

- Defining a limit informally
- Properties of limits
- Limits of continuous functions
- One-sided and two-sided limits
- Limits involving Infinity

Mid-chapter checkpoint (11.1-11.3) (1 day)

11.4 Numerical derivatives and integrals *(optional)* (3 days)

- Derivatives on a calculator
- Definite integrals on a calculator
- Computing a derivative from data

- Computing a definite integral from data

Chapter 11 review (1 day)
Chapter 11 Test (1 day)

Resources:

MyMathLab online textbook and practice via https://mlm.pearson.com/northamerica/mymathlab/

QR codes in textbook for access to instructional videos, solutions to exercise and Checkpoint exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for video solutions of selected exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for solutions to all odd-numbered exercises and tests.

Unit Modifications for Special Population Students	
Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).

Special Needs Learners	• Accommodate with completed study guides to assist with preparation on tests. • Allow more time to complete task, project, or test • Allow students to give responses in a form (oral or written) that's easier for him • Be flexible with time frames, deadlines, or modify assessments • Give alternate or paper copies to replace electronic assignments • Have another student share class notes with the special needs learner. • Higher level reasoning and questioning would have less weight than other assignments. • Receive study skill instructions. • Work with fewer items per page or line and/or materials in a larger print
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:
English Language Arts:

Reading:
RST .11-12.4 determine the meaning of symbols, key terms, and other domain specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics,
RST.11-12.7 integrate and evaluate multiple sources of information presented in diverse formats and media, for example quantitative data, video, multimedia, in order to address a question or solve a problem

Writing:
WHST.11-12.1.C Write arguments focused on discipline-specific content. Use transitions to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
WHST.11-12.4 Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience.

Social Studies:
Computer Science and Design Thinking:
Technology Education:
9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems
9.3.ST-SM.2 Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems
9.4.12.O.17 Employ critical thinking skills, for example, analyze, synthesize, and evaluate, independently and in teams to solve problems and make decisions.
Life Literacies and Key Skills: 9.4.12.CT.2 Explain the potential benefits of collaborating to enhance critical thinking and problem solving
Financial Literacy:
Science:
HS-PS1-8 Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
HS-PS1-4 Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

Integration of 21st Century Skills

Indicators: From the Partnership for 21st Century Skills (P21), the deeper learning competencies and skills for 21st century learning in this unit include:

- Critical thinking and problem solving
- Communication
- Collaboration

Unit 10: Systems and Matrices
Unit Description: Many applications in science, engineering, and business use systems that equations or inequalities as models. These systems involve two or more variables. In this unit, students will investigate several techniques used to solve such systems. Students will explore various applications, including linear programming, a method used to solve problems in management science, as well as graphs of inequalities and systems of inequalities. Students will also have an introduction to partial-fraction decomposition.
Unit Duration: 5 days
Desired Results
Standard(s): **A-CED.A** create equations that describe numbers or relationships **A-REI.C** solve systems of equations **A-REI.D** represent and solve equations and inequalities graphically
Indicators: **A-CED.A.2** create equations in two or more variables to represent relationships between quantities; Graph equations on coordinate axes with labels and scales **A-CED.A.3** represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context **A-REI.C.5** prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions **A-REI.D.12** graph the solutions to a linear inequality in two variables as a half-plane, excluding the boundary in the case of a strict inequality, and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes

Understandings:	**Essential Questions:**
Students will understand that… Many applications in science, engineering and business use systems of equations or inequalities as models. These systems involve two or more variables. In this unit students will investigate several techniques used to solve such systems. Matrices play a central role in some of these techniques and are essential for solving large systems. This unit will explore numerous applications, including linear programming, the method used to solve problems in management science. *Students will be able to…* • Solve a system of two equations using elimination and substitution methods, also including graphical methods • Have an introduction to multivariate linear systems and basic row operations • Rewrite a rational expression using partial fraction decomposition • graph a system of inequalities of similar or varying functions including an introduction to linear programming	• What methods would be best to solve a system of two equations and how do we decide which method will be the most efficient? • How can a matrix be used to solve a multivariate linear system? • How can a rational expression be deconstructed using partial fraction decomposition? • When graphing a system of any qualities how do we determine the area of the solution set?

Assessment Evidence

Performance Tasks:	**Performance Tasks:**
Checkpoints Homework MyMathLab assignments Unit Quiz Mid-Chapter checkpoint Exit/Admit Tickets	MyMathLab remediation Skill Refresher Review and Refresh exercises Vocabulary concept check Study Strategies Algebra Help

Benchmarks:
Chapter 7 Test

Learning Plan

Learning Activities: ***(optional if time allows)***

7.3 Multivariate linear systems and row operations *(optional)* (2 days)

- Triangular form for linear systems
- Partial fraction decomposition

7.4 Systems of inequalities in two variables *(optional)* (1 day)

- Graph of an inequality
- Systems of inequalities
- Linear programming

Chapter review (1 day)
Chapter Test (1 day)

Resources:

MyMathLab online textbook and practice via https://mlm.pearson.com/northamerica/mymathlab/

QR codes in textbook for access to instructional videos, solutions to exercise and Checkpoint exercises.

https://mlm.pearson.com/northamerica/mymathlab/ for video solutions of selected exercises.

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Unit Modifications for Special Population Students	
Advanced Learners	• Invite students to explore different points of view on a topic of study and compare the two. • Assign a leadership role in classroom learning • Determine where student's interests lie and capitalize on their inquisitiveness. • Expose students to a selection and use of specialized resources
Struggling Learners	• Be flexible with time frames and deadlines • Create planned opportunities for interaction between individuals in the classroom: cooperative and collaborative learning, pair and share with peers • Group students • Intentional scheduling/grouping with student/teacher of alternative background • Provide support as at-risk students move through all levels of knowledge acquisition • Tap prior knowledge
English Language Learners	• Accommodate with completed study guides to assist with preparation on tests • Allow students to give responses in a form (oral or written) that's easier for him/her • Be flexible with time frames, deadlines, or modify assessments • Create planned opportunities for interaction between individuals in the classroom: skits, cooperative and collaborative learning, student generated stories based on personal experience • Establish a framework allowing ELL students to understand and assimilate new ideas and information • Focus on domain specific vocabulary and keywords • Give alternate or paper copies to accommodate electronic assignments. • Have another student share class notes with the ELL student. • Intentional scheduling/grouping with student/teacher of language if possible • Mark texts with a highlighter. • Take more time to complete a task, project, or test. • Use manipulatives, graphic organizer, and real objects when possible • Use visual presentations/verbal materials (ex: word webs and visual organizers).
Special Needs Learners	• Accommodate with completed study guides to assist with preparation on tests. • Allow more time to complete task, project, or test • Allow students to give responses in a form (oral or written) that's easier for him • Be flexible with time frames, deadlines, or modify assessments • Give alternate or paper copies to replace electronic assignments • Have another student share class notes with the special needs learner.

	• Higher level reasoning and questioning would have less weight than other assignments. • Receive study skill instructions. • Work with fewer items per page or line and/or materials in a larger print
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:
English Language Arts:
Reading: RST.11-12.7 integrate and evaluate multiple sources of information presented in diverse formats and media, for example quantitative data, video, multimedia, in order to address a question or solve a problem
Writing:
Social Studies:
Computer Science and Design Thinking:
8.1.12.DA.5 Create data visualizations for large data sets to summarize, communicate and support different interpretations of real-world phenomena.
8.1.12.DA.6 Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
Technology Education:
9.3.ST.1 Use technology to acquire, manipulate, analyze and report data.
9.3.ST-SM.2 Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems
Life Literacies and Key Skills: 9.4.12.IML.3 Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions
Financial Literacy:
Science:

Integration of 21st Century Skills

Indicators: From the Partnership for 21st Century Skills (P21), the deeper learning competencies and skills for 21st century learning in this unit include:

- Critical thinking and problem solving
- Communication