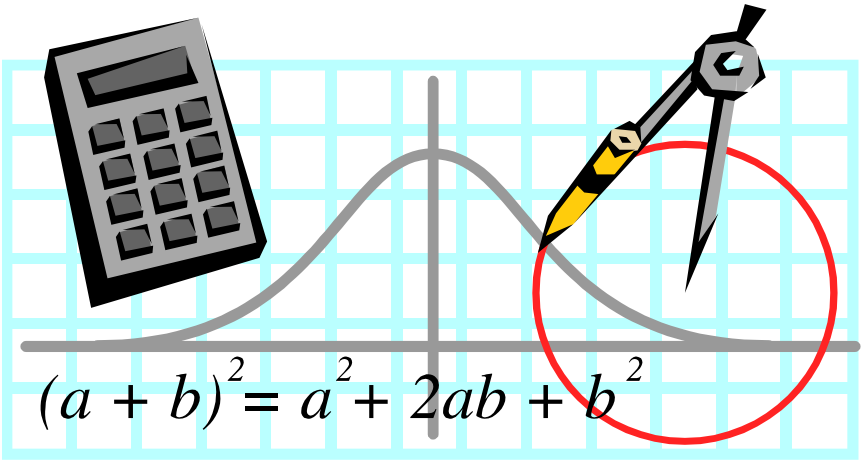
PARK RIDGE SCHOOL DISTRICT

Park Ridge, New Jersey



Algebra II Curriculum Guide

Approved by Park Ridge Board of Education – August 27, 2012

Grades 9-12 Mathematics Writing Committee

All high school mathematics teachers participated in the high school mathematics curriculum revision process, thereby affording opportunities for teachers to add their knowledge and professional experiences to the process. Teachers on the mathematics writing committee based the curriculum on teacher input and recommendations collected from collaboration efforts. The curriculum writing committee members will act as a resource to their department colleagues. Opportunities to discuss the curriculum implementation, teaching strategies, resources, as well as reflections and concerns will be provided during the 2011-12 school year.

I am grateful to the mathematics curriculum committee members for the many hours and expertise they devoted to writing this curriculum guide. The committee members are commended for their efforts and interest in providing the Park Ridge School District with a thorough high school mathematics curriculum that aligns with the Common Core State Standards for Mathematics.

According to the 2010 Common Core State Standards Initiative, "The Common Core State Mathematical Standards are designed to provide a clear understanding of what students are expected to learn, so teachers and parents know what they need to do to help them. The standards are designed to be robust and relevant to the real world, reflecting the knowledge and skills that our young people need for success in college and careers."

Dr. Cathy Timpone
Director of Curriculum & Instruction

High School Mathematics Curriculum Writing Committee:

Lynne Lupfer revised:
Mathematics Prep, Geometry Honors, Algebra II Honors,
Pre-Calculus, Pre-Calculus Honors, SAT Prep Math curriculum guides

Rachel Berger revised:
Pre-Algebra, Algebra II, Algebra II Honors curriculum guides

Erin Havel revised:
Algebra I, Algebra I Honors curriculum guides

Roseanne Wates revised:
Geometry, Statistics curriculum guides

Dana Caine revised:
Statistics curriculum guide

Anna Marie Schoenkopf revised:
Life Skills Math curriculum guide

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Life Skills Math curriculum guides

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Dr. Robert Gamper, Superintendent

Board Approved August 27, 2012

PARK RIDGE SCHOOL DISTRICT
Park Ridge, NJ

MATHEMATICS DEPARTMENT, 2011-2012

COURSE TITLE/GRADE & SUBJECT: CP Algebra II/Grades 10&11 **COURSE # 2510**

PREREQUISITE: Algebra I and Geometry

TIME ALLOCATION: 1 full year course

TEXT: Algebra 2 Holt McDougal Larson 2010 Edition

COURSE PHILOSOPHY (grades 7-12): Algebra II extends the fundamental concepts and skills of elementary algebra to a higher level, and, while introducing new concepts, draws upon the same basic themes studied previously in Algebra I. Algebra II also offers the opportunity to apply algebraic skills and reasoning to the related mathematical areas of trigonometry, data analysis, probability, and discrete mathematics.

- **OVERARCHNG ENDURING UNDERSTANDINGS (grade 7-12):** Mathematics can be used to solve problems outside of the mathematics classroom. Mathematics is built on reason. Make sense of problems and persevere in solving them. Reason abstractly and quantitatively. Reasoning allows us to make conjectures and to prove conjectures. Construct viable arguments and critique the reasoning of others. Model with mathematics. Use appropriate tools strategically. Attend to precision, as precise language helps us express mathematical ideas. Look for and make use of structure. Look for and express regularity in repeated reasoning. What makes an algebraic algorithm both effective and efficient?

OVERARCHING ESSENTIAL QUESTIONS (grades 7-12): How are solving and proving different? How are showing and explaining different? How do you make sense of different strategies? How do you determine the strengths and weaknesses of different strategies to solve equations?

TABLE OF CONTENTS (UNITS OF STUDY):

UNIT ONE: LINEAR RELATIONS AND FUNCTIONS

UNIT SUMMARY:
As an overview:

1. Goal: The purpose of this unit is to allow for students to learn that numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.
2. Sequencing: This unit begins with equations and inequalities, builds to linear relations and functions, and concludes with solving systems of equations and inequalities, and basic matrix operations.
3. Rationale: Students will use multiple problem solving strategies to solve equations, including real life mathematical problems.

21ST CENTURY THEMES:

- ☒ Global Awareness
- ☒ Financial, Economic, Business and Entrepreneurial Literacy
- ☒ Civic Literacy
- ☒ Health Literacy

PRIMARY INTERDISCIPLINARY CONNECTIONS:
21st Century Life & Career Skills:

- Critical Thinking and Problem Solving
- Creativity and Innovation
- Collaboration, Teamwork, and Leadership
- Income and Careers
- Money Management
- Career Preparation

STANDARDS

N-RN
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-Q
1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
2. Define appropriate quantities for the purpose of descriptive modeling.
3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
N-VM
6. (+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.
7. (+) Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.
8. (+) Add, subtract, and multiply matrices of appropriate dimensions.
9. (+) Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but

still satisfies the associative and distributive properties.
10. (+) Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.
11. (+) Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.
12. (+) Work with 2 × 2 matrices as transformations of the plane, and interpret the absolute value of the determinant in terms of area.

A-SSE Seeing Structure in Expressions

1. Interpret expressions that represent a quantity in terms of its context.
    a. Interpret parts of an expression, such as terms, factors, and coefficients.
    b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret* $P(1+r)$n *as the product of P and a factor not depending on P.*

A-CED Creating Equations

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.*
2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*
4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law* $V = IR$ *to highlight resistance R.*

A-REI Reasoning with Equations and Inequalities

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.
3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
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.
6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
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).
11. Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
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.

F-IF Interpreting Functions

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 $y = f(x)$.
2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*
5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*
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.
7. 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.

F-BF
1. 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.

3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the 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.*
9.1.12.A.1 Apply critical thinking and problem-solving strategies during structured learning experiences.
9.1.12.B.1 Present resources and data in a format that effectively communicates the meaning of the data and its implications for solving problems, using multiple perspectives.
9.1.12.C.5 Assume a leadership position by guiding the thinking of peers in a direction that leads to successful completion of a challenging task or project.
9.1.12.F.2 Demonstrate a positive work ethic in various settings, including the classroom and during structured learning experiences.
RST.11.3-7
3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
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*.
5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

UNIT ESSENTIAL QUESTIONS:	**UNIT ENDURING UNDERSTANDINGS:**
▪ What makes an algebraic algorithm both effective and efficient?	▪ Numbers, measures, expressions, equations, and inequalities can

▪ What are the relationships among the number sets in the real number system? ▪ How can the properties of real numbers be used in mathematics? ▪ Why is the order of operations important and necessary? ▪ How can we use properties to simplify and evaluate expressions? ▪ What is meant by a solution? ▪ How can equations be used and/or modeled to represent a real world problem? ▪ Why are inequalities necessary when solving real world problems? ▪ How does solving inequalities differ from solving equations? ▪ How can compound inequalities help describe real world situations? ▪ How do you solve absolute value inequalities algebraically and graphically? ▪ How can relations be represented? ▪ How do we determine whether a relation is a function? ▪ How do we identify the domain and range of a relation or function? ▪ How do you use the equation of the line to create a graph? ▪ How can direct variation (proportional) relationships be represented using rules, tables, and graphs? ▪ How can direct variation (proportions) be used to solve real-world problems? ▪ How can you use regression models to make predictions? ▪ How do you use transformations to help graph absolute value functions? ▪ How is graphing inequalities similar to and different from graphing equations? ▪ How can inequalities/systems of inequalities be used to model problems in the real world? ▪ How can you solve a system of equations graphically? ▪ How can you solve a system of equations algebraically? ▪ How can systems of equations be used to solve real-world problems? ▪ How can you solve a system of inequalities by graphing? ▪ How can you solve a system of three equations and three unknowns algebraically?	represent mathematical situations and structures in many equivalent forms. ▪ There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities. ▪ Relations and functions are mathematical relationships that can be represented and analyzed using words, tables, graphs, and equations. ▪ Mathematical functions are relationships that assign each member of one set (domain) to a unique member of another set (range), and the relationship is recognizable across representations. ▪ Bivariate data can be modeled with mathematical functions that approximate the data well and help us make predictions based on the data. ▪ Families of functions exhibit properties and behaviors that can be recognized across representations. Functions can be transformed, combined, and composed to create new functions in mathematical and real world situations. ▪ Properties of numbers and equality can be used to transform an inequality into equivalent simpler inequalities in order to find solutions. Useful information about inequalities, including solutions, can be found by analyzing graphs or tables.

TIME ALLOTMENT	CONTENT	SKILLS	ASSESSMENT
	▪ Properties of real numbers ▪ Order of operations ▪ Algebraic expressions ▪ Linear equations ▪ Formulas and equations ▪ Linear Inequalities ▪ Absolute value equations ▪ Absolute value inequalities ▪ Relations and functions ▪ Slope and rate of change ▪ Graphing linear equations ▪ Equations of lines ▪ Direct variation ▪ Scatter plots & Best-fitting lines ▪ Absolute value functions and transformations ▪ Linear inequalities in two variables ▪ Linear systems of equations ▪ Substitution method ▪ Linear combination/elimination method ▪ Linear systems of inequalities ▪ Linear equations in three variables ▪ Matrix Addition ▪ Matrix Subtraction ▪ Matrix Multiplication ▪ Determinant ▪ Cramer's Rule	▪ Compare and order rational and irrational numbers (includes graphing real numbers) ▪ Use the properties of rational and irrational numbers. ▪ Create a variable expression based on a verbal description ▪ Understand and apply the properties of real numbers to simplify and evaluate algebraic expressions ▪ Manipulate formulas and equations ▪ Discriminate between parts of an expression such as constants, terms, factors, coefficients, and variables ▪ Generate solutions using algebraic principles and multiple problem-solving approaches. ▪ Solve equations and inequalities. ▪ Create equations to represent relationships between quantities ▪ Sketch graphs of linear equations and inequalities ▪ Differentiate between independent and dependent variables ▪ Interpret rates of change ▪ Solve linear systems of equations using multiple methods ▪ Validate solutions and judge the reasonableness of the solution ▪ Use matrices to represent and manipulate data	▪ **Formative & Summative Assessments** ▪ Warm-up activities ▪ Short answer questions ▪ Vocabulary reviews ▪ Quizzes ▪ Chapter tests ▪ Projects ▪ Sample Projects: Cell Phone system of equations project, Cramer's Rule poster project for Area of a Triangle ▪ Exploratory Activities ▪ Sample Activities: Distance between knots in a rope, graphing activities, Best-fit lines ▪ Textbook Assignments ▪ Class Discussions ▪ Student Participation ▪ Group Presentations ▪ Sample presentations: proving matrix identities ▪ Unit assessments

		▪ Perform addition, subtraction, scalar multiplication, and multiplication on matrices ▪ Understand that matrix multiplication is not commutative ▪ Explain the role of the zero and identity matrices ▪ Solve for determinant ▪ Use Cramer's Rule to solve systems of a 2x2 and 3x3 system of equations	

TEACHER RESOURCES	**TEACHER NOTES/REFLECTIONS**
▪ Classroom textbook ▪ Smartboard software ▪ Classroom laptops ▪ TI-83 or 84 ▪ ELMO – document camera ▪ www.classzone.com ▪ www.hotmath.com ▪ www.keymath.com ▪ Internet access in classroom	If time permits, teacher may wish to include the following topics: 1. Vectors 2. Augmented Matrices (row operations) 3. Operations on 3x3 or larger matrices. 4. Inverse matrices

UNIT TWO: QUADRATIC, POLYNOMIAL, RADICAL RELATIONS AND FUNCTIONS, POWERS, ROOTS & RADICALS

UNIT SUMMARY:

As an overview:

1. Goal: The purpose of this unit is to allow for students to discover that there are multiple approaches to solving problems and that we can arrive at the same solution, if it exists, by using multiple approaches.
2. Sequencing: This unit builds the foundation of quadratic, polynomial, radical, and rational functions from the Algebra 1 course and introduces the idea of complex (imaginary) numbers and the concept of no solution. It acts as a segue into exponential and logarithmic functions.
3. Rationale: Students will use multiple problem solving strategies to solve equations, including real life mathematical problems. Students will model nonlinear relationships graphically and algebraically.

21ST CENTURY THEMES:

- ☒ Global Awareness
- ☒ Financial, Economic, Business and Entrepreneurial Literacy
- ☒ Civic Literacy
- ☒ Health Literacy

PRIMARY INTERDISCIPLINARY CONNECTIONS:

21st Century Life & Career Skills:

- Critical Thinking and Problem Solving
- Creativity and Innovation
- Collaboration, Teamwork, and Leadership
- Income and Careers
- Money Management
- Career Preparation

STANDARDS

N-RN

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. *For example, we define 51/3 to be the cube root of 5 because we want (51/3)3 = 5(1/3)3 to hold, so (51/3)3 must equal 5.*
2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.

N-CN

1. Know 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.
2. Use the relation *i*2 = –1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
3. (+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.
7. Solve quadratic equations with real coefficients that have complex solutions.

A-SSE

2. Use the structure of an expression to identify ways to rewrite it. *For example, see* $x4 – y4$ *as* $(x2)2 – (y2)2$, *thus recognizing it as a difference of squares that can be factored as* $(x2 – y2)(x2 + y2)$.
3. Choose and produce an 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.
    c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression* 1.15t *can be rewritten as* $(1.151/12)12t \approx 1.01212t$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*

A-APR

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.
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 $p(x)$.
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.
4. Prove polynomial identities and use them to describe numerical relationships. *For example, the polynomial identity* $(x2 + y2)2 = (x2 – y2)2 + (2xy)2$ *can be used to generate Pythagorean triples.*
6. Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, 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.
7. If time permits, (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.

A-REI

2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
4. 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 (e.g., for $x2 = 49$), 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.

7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For example, find the points of intersection between the line* $y = –3x$ and the circle $x2 + y2 = 3$.

F-IF

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 $y = f(x)$.
2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is*

increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.
5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*
7. 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. Extra, if time permits: Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.
8. 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 in a 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. *For example, identify percent rate of change in functions such as y = (1.02)t, y = (0.97)t, y = (1.01)12t, y = (1.2)t/10, and classify them as representing exponential growth or decay.*
9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*
F-BF
3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the 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.
4. 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) =2 x3 or f(x) = (x+1)/(x–1) for x ≠1.*
    b. If time permits, (+) Verify by composition that one function is the inverse of another.
    c. If time permits, (+) Read values of an inverse function from a graph or a table, given that the function has an inverse.
    d. If time permits, (+) Produce an invertible function from a non-invertible function by restricting the domain.
9.1.12.A.1 Apply critical thinking and problem-solving strategies during structured learning experiences.
9.1.12.B.1 Present resources and data in a format that effectively communicates the meaning of the data and its implications for solving problems, using multiple perspectives.
9.1.12.C.5 Assume a leadership position by guiding the thinking of peers in a direction that leads to successful completion of a challenging task or project.
9.1.12.F.2 Demonstrate a positive work ethic in various settings, including the classroom and during structured learning experiences.
RST.11.3-7
3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
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*.
5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

UNIT ESSENTIAL QUESTIONS:	**UNIT ENDURING UNDERSTANDINGS:**
• What is a quadratic function and how can we use its properties to solve problems? • What are the characteristics of quadratic functions? • How can you graph a quadratic function using the properties of parabolas? • How can you use transformations to help graph quadratic functions? • What real-life situations do quadratic functions represent? • Why do you think it is important to have more than one method to solve a quadratic equation? • What are the methods for solving a quadratic equation? • Why do we factor quadratic expressions? • What are complex numbers? • What are imaginary numbers and how are they used? • How can we rewrite a quadratic function in an equivalent form? • How do you identify and classify a polynomial function? • What are the characteristics of a polynomial function? • How can we determine the shape and tendency of an equation using the standard form of a polynomial? • What methods can be used to find the zeros of a polynomial function? • How are the zeros, factors, and solutions to a polynomial related? • How can synthetic division or long division help graph or factor polynomials? • How do you solve polynomial equations? • What are the properties of powers, roots, and radicals? • How can these properties be used to evaluate, simplify, and	▪ There are several methods to approach problem solving. ▪ Some mathematical relationships are always true and are used as the rules of arithmetic and algebra for writing equivalent forms of expressions and solving equations. • Quadratic functions form U-shaped graphs known as parabolas. • There is more than one way to solve a problem, regardless of the method, that will give the same answer. • The characteristics of a polynomial function are odd, even, or neither, end behavior, zeros, and extrema. • To determine asymptotes of rational equations and functions, you need to find points of discontinuity. • The properties of powers, roots, and radicals are similar to the properties of integer exponents and are used in a similar manner to simplify and solve.

solve? • What criteria would be used to assess rational equations and functions? • How do you find the inverse of a function? • How do you solve rational equations? • What is the purpose of rationalizing the denominator?	

TIME ALLOTMENT	CONTENT	SKILLS	ASSESSMENT
	• Quadratic functions • Parabola • Vertex • Axis of symmetry • Standard Form • Vertex Form • Intercept Form • Maximum • Minimum • Factoring • Greatest common factor • Perfect square trinomial • Difference of two squares • Quadratic equation • Solving by square roots • Zero of a function • Rationalizing denominator • Complex numbers • Imaginary numbers • Complex conjugates • Methods for solving quadratic equations • Completing the square • Quadratic Formula • Discriminant	• Classify a function as linear, quadratic, or neither. • Identify and find the vertex, axis of symmetry, maximum and minimum, and corresponding points of a parabola. • Construct a quadratic equation with key components using vertex form, standard form, and x-intercept form. • Graph a quadratic function using standard, vertex, and intercept form. • Discriminate between different forms of quadratic equations and corresponding graphs • Use critical characteristics of quadratics to graph and/or write equations. • Factor a variety of quadratic expressions (difference of two squares, perfect square trinomial) • Solve quadratic functions with both real and imaginary solutions. • Solve quadratic equations using multiple approaches (completing	▪ **Formative & Summative Assessments** ▪ Warm-up activities ▪ Short answer questions ▪ Vocabulary reviews ▪ Quizzes ▪ Chapter tests ▪ Projects ▪ Sample Projects: Birthday Polynomial Project ▪ Exploratory Activities ▪ Sample Activities: Creating own equations that have imaginary solutions ▪ Textbook Assignments ▪ Class Discussions ▪ Student Participation ▪ Group Presentations ▪ Sample presentations: The meaning of “rational” in everyday language. ▪ Unit assessments

		the square, square roots, quadratic formula) • Find the discriminant of a quadratic equation. • Use the discriminant to determine the type and number of solutions for a given quadratic equation. • Solve quadratic equations using a graphing calculator. • Simplify imaginary expressions. • Perform multiple operations on complex numbers.	
	• Polynomial functions • Leading Coefficient • Degree of a polynomial • Standard form • End behavior • Factor by grouping • Sum of cubes • Difference of Cubes • Rational Root Theorem • Long division • Remainder theorem • Synthetic division • Factor theorem • Relative extrema	• Identify and classify a polynomial by degree and number of terms • Express polynomials in standard form • Express polynomials in factored form • Solve polynomial equations • Find the roots of a polynomial expression using factoring, polynomial long division, synthetic division, and the rational root theorem) • Find the zeros of a polynomial function. • Solve polynomial equations by factoring. • Write a polynomial function from its zeros. • Find the domain and range of a polynomial function • Find the relative extrema of a polynomial function using a graphing calculator	
Powers, Roots, & Radicals	• Properties of exponents	• Determine all real nth roots of a	

	• Properties of rational exponents • Nth roots • Power functions • Function operations • Inverse Functions • Graph of square root function • Graph of cube root function • Radical equations	given real number • Evaluate expressions with rational and negative exponents • Add, subtract, multiply, and divide rational and negative exponents. • Recognize that a power function is a particular type of polynomial function • Simplify radical expressions • Solve radical equations • Evaluate radical expressions • Combine functions using different operations • Write the inverse of a function • Verify two functions are inverses of each other	
Rational Equations & Functions 2-3 weeks	• Rational expressions • Complex fractions • Rational Functions • Inverse functions • Composition of functions • Asymptotes • Horizontal • Vertical	• Determine the asymptotes of a rational function • Simplify and evaluate rational functions • Graph rational functions • Identify asymptotes of a rational function • Add, Subtract, Multiply, Divide rational expressions • Solve rational equations	

TEACHER RESOURCES	**TEACHER NOTES/REFLECTIONS**
▪ Classroom textbook ▪ Smartboard software ▪ Classroom laptops ▪ TI-83 or 84 ▪ ELMO – document camera	If time permits, teacher may wish to include the following topics: 1. Complex numbers in polar form 2. Extend identities to complex numbers 3. Fundamental Theorem of Algebra 4. Binomial Theorem (expansion and relation to Pascal's Triangle)

▪ www.classzone.com ▪ www.hotmath.com ▪ www.keymath.com ▪ Internet access in classroom	5. Graphing Rational Functions 6. Asymptotes/Holes in graph 7. Conic Sections 8. Direct/Joint variation

UNIT THREE: OTHER NONLINEAR RELATIONS AND FUNCTIONS

UNIT SUMMARY:

As an overview:

1. Goal: The goal of this unit is for students to apply learning of linear and nonlinear relationships into the concepts of exponential growth and decay. This concept is highly relatable to real life mathematical and scientific applications.
2. Sequencing: Once students have mastered the basics of linear, quadratic, polynomial, and radical functions, they will be able to apply the same properties of exponential and logarithmic functions and be able to discern the difference between all types of functions.
3. Rationale: Mastery of all prior algebraic properties is necessary to proceed at this point in preparation for precalculus.

21ST CENTURY THEMES:	**PRIMARY INTERDISCIPLINARY CONNECTIONS:**
☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy ☒ Civic Literacy ☒ Health Literacy	21st Century Life & Career Skills: • Critical Thinking and Problem Solving • Creativity and Innovation • Collaboration, Teamwork, and Leadership • Income and Careers • Money Management • Career Preparation

STANDARDS

F-IF

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 $y = f(x)$.

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

4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*

5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*

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

3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the

value of *k* given the 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-LE
1. Distinguish between situations that can be modeled with linear functions and with exponential functions.
    a. Prove that linear functions grow 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.
    c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
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).
3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.
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.
5. Interpret the parameters in a linear or exponential function in terms of a context.
9.1.12.A.1 Apply critical thinking and problem-solving strategies during structured learning experiences.
9.1.12.B.1 Present resources and data in a format that effectively communicates the meaning of the data and its implications for solving problems, using multiple perspectives.
9.1.12.C.5 Assume a leadership position by guiding the thinking of peers in a direction that leads to successful completion of a challenging task or project.
9.1.12.F.2 Demonstrate a positive work ethic in various settings, including the classroom and during structured learning experiences.
RST.11.3-7
3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
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*.
5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

UNIT ESSENTIAL QUESTIONS:	**UNIT ENDURING UNDERSTANDINGS:**
▪ What are exponential functions and when are they used? ▪ What are logarithmic functions and how are they used? ▪ How can we use exponential functions to model real life data?	▪ Exponential and logarithmic functions are similar functions, but are written differently. ▪ Exponential and logarithmic functions are used to model data.

▪ How can we use logarithmic functions to model real life data? ▪ How are exponential and logarithmic functions similar? ▪ How do we use exponential functions to model growth and decay? ▪ How do financial institutions use exponential functions to calculate compound interest? ▪ How do scientists use exponential functions? ▪ How do we graph exponential and logarithmic functions? ▪ How do we distinguish between linear, quadratic, cubic, and exponential functions?	▪ Exponential functions grow by equal factors over equal intervals.

TIME ALLOTMENT	CONTENT	SKILLS	ASSESSMENT
	• Exponential function • Exponential growth • Asymptote • Growth factor • Exponential decay • Decay factor • Compound interest • Properties of logarithms • Logarithm • Logarithmic function • Common logarithm • Natural logarithm • Change of Base Formula • Natural base *e*	• Graph exponential growth functions • Graph exponential decay functions • Solve exponential equations • Distinguish between linear, quadratic, and exponential functions. • Evaluate logarithmic expressions • Graph logarithmic functions • Solve logarithmic equations • Simplify and evaluate expressions using the properties of logarithms • Solve logarithmic equations using the properties of logarithms • Solve exponential equations • Solve using change of base formula • Define and apply the number *e* • Use logarithms to solve problems involving exponential growth and	▪ **Formative & Summative Assessments** ▪ Warm-up activities ▪ Short answer questions ▪ Vocabulary reviews ▪ Quizzes ▪ Chapter tests ▪ Projects ▪ Sample project: research on interest and scientific data ▪ Exploratory Activities ▪ Sample: Calculating interest ▪ Textbook Assignments ▪ Class Discussions ▪ Student Participation ▪ Group Presentations ▪ Unit assessments

		decay. • Demonstrate the effect of compound interest	

TEACHER RESOURCES	**TEACHER NOTES/REFLECTIONS**
▪ Classroom textbook ▪ Smartboard software ▪ Classroom laptops ▪ TI-83 or 84 ▪ ELMO – document camera ▪ www.classzone.com ▪ www.hotmath.com ▪ www.keymath.com ▪ Internet access in classroom	If time permits, teacher may wish to include the following topics: 1. Inverse relationship between exponents and logarithms

UNIT FOUR: SEQUENCES & SERIES, PROBABILITY, & DATA ANALYSIS

UNIT SUMMARY:

As an overview:

1. Goal: The goal of this unit is for students to develop an understanding of the concepts and techniques of data analysis, probability, and discrete mathematics, and will use them to model situations, solve problems, and analyze and draw appropriate inferences from data.
2. Sequencing: This unit is completed after master of linear and nonlinear functions. It is part of the culmination of Algebra 2, leading to precalculus.
3. Rationale: Students develop critical thinking skills in this unit and apply the mathematics learned to real life situations.

21ST CENTURY THEMES:

- ☒ Global Awareness
- ☒ Financial, Economic, Business and Entrepreneurial Literacy
- ☒ Civic Literacy
- ☒ Health Literacy

PRIMARY INTERDISCIPLINARY CONNECTIONS:

21st Century Life & Career Skills:

- Critical Thinking and Problem Solving
- Creativity and Innovation
- Collaboration, Teamwork, and Leadership
- Income and Careers
- Money Management
- Career Preparation

STANDARDS

S-ID

1. Represent data with plots on the real number line (dot plots, histograms, and box plots).
2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.
5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
6. 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.

7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
8. Compute (using technology) and interpret the correlation coefficient of a linear fit.
9. Distinguish between correlation and causation.

S-IC

1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?*
3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
4. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
6. Evaluate reports based on data.

S-CP

1. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").
2. Understand that two events *A* and *B* are independent if the probability of *A* and *B* occurring together is the product of their probabilities, and use this characterization to determine if they are independent.
3. Understand the conditional probability of *A* given *B* as *P*(*A* and *B*)/*P*(*B*), and interpret independence of *A* and *B* as saying that the conditional probability of *A* given *B* is the same as the probability of *A*, and the conditional probability of *B* given *A* is the same as the probability of *B*.
4. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.*
5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*
6. Find the conditional probability of *A* given *B* as the fraction of *B*'s outcomes that also belong to *A*, and interpret the answer in terms of the model.
7. Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.

A-SSE

4. Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.*

F-IF

3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.*

F-BF

1. 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, andrelate these functions to the model.
2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
9.1.12.A.1 Apply critical thinking and problem-solving strategies during structured learning experiences.
9.1.12.B.1 Present resources and data in a format that effectively communicates the meaning of the data and its implications for solving problems, using multiple perspectives.
9.1.12.C.5 Assume a leadership position by guiding the thinking of peers in a direction that leads to successful completion of a challenging task or project.
9.1.12.F.2 Demonstrate a positive work ethic in various settings, including the classroom and during structured learning experiences.
RST.11.3-7
3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
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*.
5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

UNIT ESSENTIAL QUESTIONS:	**UNIT ENDURING UNDERSTANDINGS:**
▪ How can change be best represented mathematically? ▪ How can patterns, relations, and functions be used as tools to best describe and help explain real-life situations? ▪ What is the difference between explicit and implicit? ▪ What are the different types of sequences? ▪ What are the different types of series? ▪ How do we use arithmetic sequences and series? ▪ How do we use geometric sequences and series? ▪ How can the collection, organization, interpretation, and display of data be used to answer questions?	▪ The different types of sequences and series are arithmetic and geometric. ▪ Sequences and series have applications in mathematics, science, and finance. ▪ Probability quantifies the likelihood that something will happen and statistics enables us to make predictions and informed decisions. ▪ The message conveyed by the data depends on how the data is collected, represented, and summarized. ▪ The results of a statistical investigation can be used to support or refute an argument.

TIME	**CONTENT**	**SKILLS**	**ASSESSMENT**

ALLOTMENT			
	• Sequence • Finite sequence • Infinite sequence • Arithmetic sequence • Geometric sequence • Common ratio • Convergent series • Divergent series • Recursive sequence • Iteration • Probability • Compound events	• Use models and algebraic formulas to represent and analyze sequences and series. • Use arithmetic sequences • Find the arithmetic mean • Write algebraic rules to define sequences • Use summation notation • Find the nth term of a sequence • Use geometric sequences • Find finite and infinite sums of geometric series • Find the geometric means • Find and use measures of central tendencies to represent data • Find standard deviation • Calculate probabilities/fit a line to data by estimation • Construct and interpret graphs/plots • Find the basic probability of a set of events • Determine how many ways an event can occur • Find the probability of mutually exclusive events, inclusive events, two dependent events, two independent events • Find the odds of events	▪ **Formative & Summative Assessments** ▪ Warm-up activities ▪ Short answer questions ▪ Vocabulary reviews ▪ Quizzes ▪ Chapter tests ▪ Projects ▪ Sample: Data collection, observation, and analysis ▪ Exploratory Activities ▪ Textbook Assignments ▪ Class Discussions ▪ Student Participation ▪ Group Presentations ▪ Sample: Finding standard deviation using class data ▪ Unit assessments

TEACHER RESOURCES	TEACHER NOTES/REFLECTIONS
▪ Classroom textbook	If time permits, teacher may wish to include the following topics:

▪ Smartboard software ▪ Classroom laptops ▪ TI-83 or 84 ▪ ELMO – document camera ▪ www.classzone.com ▪ www.hotmath.com ▪ www.keymath.com ▪ Internet access in classroom	1. Permutations and combinations 2. Using probability to make decisions 3. Weighing outcomes 4. Binomial Theorem

UNIT FIVE: TRIGONOMETRY

UNIT SUMMARY:
As an overview:

1. Goal: The goal of this unit is for students to extend their knowledge of geometry and apply it into Algebra 2.
2. Sequencing: This unit is the final unit in Algebra 2, as it will be the final part for preparation for precalculus.
3. Rationale: Students combine multiple strands of mathematics, developing critical thinking skills and applying the mathematics learned to real life situations.

21ST CENTURY THEMES:

- ☒ Global Awareness
- ☒ Financial, Economic, Business and Entrepreneurial Literacy
- ☒ Civic Literacy
- ☒ Health Literacy

PRIMARY INTERDISCIPLINARY CONNECTIONS:
21st Century Life & Career Skills:

- Critical Thinking and Problem Solving
- Creativity and Innovation
- Collaboration, Teamwork, and Leadership
- Income and Careers
- Money Management
- Career Preparation

STANDARDS

F-TF
1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
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.
8. Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.
If time permits, include the following strands in this unit:
3. (+) Use special triangles to determine geometrically the values of sine, cosine, tangent for Π/3, Π /4 and Π /6, and use the unit circle to express the values of sine, cosine, and tangent for Π $-x$, Π $+x$, and 2 Π $-x$ in terms of their values for x, where x is any real number.
4. (+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.
5. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.
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.
7. (+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.

9. (+) Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.
9.1.12.A.1 Apply critical thinking and problem-solving strategies during structured learning experiences.
9.1.12.B.1 Present resources and data in a format that effectively communicates the meaning of the data and its implications for solving problems, using multiple perspectives.
9.1.12.C.5 Assume a leadership position by guiding the thinking of peers in a direction that leads to successful completion of a challenging task or project.
9.1.12.F.2 Demonstrate a positive work ethic in various settings, including the classroom and during structured learning experiences.
RST.11.3-7
3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
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*.
5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

UNIT ESSENTIAL QUESTIONS:	**UNIT ENDURING UNDERSTANDINGS:**
▪ What are the trigonometric functions in right triangles? ▪ What is radian measure and how is it used? ▪ How can the Law of Sines be used to solve a triangle? ▪ What are the trigonometric identities? ▪ How can we use trigonometric identities to simplify expressions?	▪ The domain of trigonometric functions can be extended using the unit circle. ▪ Trigonometric functions can be used to model periodic phenomena ▪ Trigonometric identities can be proved and applied in real life situations.

TIME ALLOTMENT	**CONTENT**	**SKILLS**	**ASSESSMENT**
	• Trigonometry • Sine, Cosine, Tangent • Cosecant, Secant, Cotangent • Radian • Law of Sines • Unit Circle	• Find all trigonometric ratios • Understand radian measure • Use the Law of Sine sot solve a triangle • Find values of trigonometric functions based on the unit circle	▪ **Formative & Summative Assessments** ▪ Warm-up activities ▪ Short answer questions ▪ Vocabulary reviews ▪ Quizzes

	• Trigonometric Identities	• Use the properties of periodic functions to evaluate trigonometric functions • Prove the Pythagorean identities	▪ Chapter tests ▪ Projects ▪ Sample: Create your own unit circle ▪ Exploratory Activities ▪ Textbook Assignments ▪ Class Discussions ▪ Student Participation ▪ Group Presentations ▪ Unit assessments

TEACHER RESOURCES	**TEACHER NOTES/REFLECTIONS**
▪ Classroom textbook ▪ Smartboard software ▪ Classroom laptops ▪ TI-83 or 84 ▪ ELMO – document camera ▪ www.classzone.com ▪ www.hotmath.com ▪ www.keymath.com ▪ Internet access in classroom	If time permits, teacher may wish to include the following topics: 1. Prove and apply trigonometric identities 2. Model periodic phenomena with trigonometric functions