Huntsville City Schools

2017 – 2018 Pacing Guide

Algebra II/Trig and Algebra II/Trig Honors

FIRST NINE WEEKS

Important Notes:

1. Common Core objectives are given by number

2. The number of days listed are approximate.

3. Students will not be allowed to use graphing calculators on all exams.

The Textbook for this course is: Algebra 2 Common Core, Pearson

Honors Algebra II Trig covers the same course of study as Algebra II Trig but in greater depth and more challenging applications. LTF/NMSI lessons are used to supplement Algebra II/ Trig lessons. These materials can be found at www.apluscollegeready.org .

Math Practices:

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. The first of these are the NCTM process standards of problem solving, reasoning and proof, communication, representation, and connections. The second are the strands of mathematical proficiency specified in the National Research Council's report *Adding It Up*: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy).

1. **Make sense of problems and persevere in solving them.**
2. **Reason abstractly and quantitatively.**
3. **Construct viable arguments and critique the reasoning of others.**
4. **Model with mathematics**
5. **Use appropriate tools strategically.**
6. **Attend to precision.**
7. **Look for and make use of structure.**
8. **Look for and express regularity in repeated reasoning.**

Elaboration on each standard: www.corestandards.org/Math/Practice/

Kid friendly language: www.buncombe.k12.nc.us/Page/37507

Listed below are the technology standards for grades nine through twelve. You are to make every effort to incorporate the applicable standards into your daily classroom lessons. These standards should be noted in your lesson plans.

Functions, Equations and Graphs: Chapter 1 and Chapter 2

Standards	Resources	Approximate Pacing
20.) 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-CED1] 21.) Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. [A-CED2] 30. a. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. [F-IF7b] 31.) Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. [F-IF8] 32.) Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). [F-IF9] 34.) 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 kgiven the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd	Sections: 1.3 Algebraic Expressions *regular only • Evaluating Algebraic Expressions • Simplifying Algebraic Expressions 1.4 Solving Equations *regular only • Solving One-Step Equations • Solving Multi-step Equations • Equations with No Solution+Identities • Literal Equations 1.5 Solving Inequalities [A-CED1] • Writing and Inequality Verbally • Solving and Graphing Inequalities • Applications of Inequalities • Inequalities with No Solution+All Real Numbers • Compound Inequalities 1.6 Absolute Value Equations and Inequalities [A-CED1] • Solving an Absolute Value Equation • Solving a Multi-step Absolute Value Equation • Extraneous Solutions • Solving Absolute Value Inequalities 2.3 Linear Functions + Slope-Intercept Form [A-CED2] • Finding Slope given 2 points	8 days

functions from their graphs and algebraic expressions for them. [F-BF3]	• **Writing an equation in Slope Intercept Form given slope and y-intercept** • **Writing an equation in Slope-intercept Form given Standard Form, Identify slope and y-intercept given Standard Form** • **Graphing a Linear Equation given Standard Form, Slope-intercept From** **2.4 More about Linear Equations [F-IF9] [F-IF8]** • **Writing linear equation in Point-Slope Form given point and slope** • **Writing linear equation in point-slope form given 2 points** • **Writing linear equation in standard form given slope-intercept** • **Graphing an equation using intercepts** • **Applications of linear equations** • **Writing equations of parallel and perpendicular lines** **CB 2.4 Piecewise Functions [F-IF7b]** • **Graphing a piece-wise function by hand and with a graphing utility** • **Writing a piece-wsie function given the graph of the function** **Honors: 2.5 Using Linear Models** **2.6 Families of Functions [F-BF3]** • **Vertical and Horizontal Translations** • **Reflections of Functions** • **Stretching and Compressing Functions** • **Transformations of Functions** **2.7 Absolute Value Functions and Graphs [F-BF3]** • **Graphing an Absolute Value Function** • **Vertical and Horizontal Translations of Absolute Value Functions** • **Vertical stretch and Compresssion of Absolute Value functions** • **Identifying translations given equation**	

	• Writing Absolute Value Function given graph 2.8 Two-Variable Inequalities [A-CED2] • Graphing Linear Inequalities • Applications of Linear Inequalities • Graphing an absolute value inequality • Writing an inequality given a graph	

Linear Systems: Chapter 3

Standard	Resources	Approximate Pacing
27. 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. [A-REI11] 21. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. [A-CED2] 22. 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. [A-CED3]	Sections: 3.1 Solving Systems using Graphs and Tables [A-CED2] • Using a graph or table to solve a system of linear equations • Honors: Using a table to solve an application problem involving a system • Honors: Linear Regression • Classifying Systems without graphing 3.2 Solving Systems Algebraically [A-REI11] • Solving by substitution • Honors: Applications of substitution • Solving by Elimination • Equivalent Systems 3.3 Systems of Inequalities [A-CED3] • Solving a system of inequalities numerically • Solving a system of inequalities by graphically • Honors: Applications of systems of inequalities Honors: 3.4 Linear Programming	3 days

	Honors: CB 3.5 Graphs in 3 Dimensions **Honors: 3.5 Systems with 3 Variables [A-CED3]** (Section 3.6 can be referenced with Ch 12 content) **NMSI Unit 1** **NMSI Lessons:** **Literal Equations** **Introducing Interval Notation** **Transformations of Functions Exploration** **Even/Odd Functions** **Transforming Domain and Range** **Applying Piecewise Functions** **Exploring Inequalities** **Systems of Linear Inequalities**	

Quadratic Function Equations: Chapter 4

Standards	Resources	Pacing Recommendation / Date(s) Taught
13. Use the structure of an expression to identify ways to rewrite it. [A-SSE2] **20. 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-CED1]**	**Sections:** **4.1 Quadratic Functions + Transformations** **[F-BF3] [F-IF7]** • **Graphing $f(x) = ax^2$** • **Graphing Translations of $f(x) = ax^2$** • **Interpreting Vertex Form** • **Using vertex form**	**10 days**

21. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. [A-CED2] **22. 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. [A-CED3]** **25. Recognize when the quadratic formula gives complex solutions, and write them as $a \pm bi$ for real numbers a and b. [A-REI4b] (17 b from Algebra I** **29. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. [F-IF5]** **30. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. [F-IF7]** **31. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. [F-IF8]** **32. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). [F-IF9]** **34. 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-BF3]** **12. Interpret expressions that represent a quantity in terms of its context. [A-SSE1]**	**4.2 Standard Form of Quadratic Function [A-CED2] [F-IF8]** • **Finding the features of a quadratic function given standard form** • **Graphing quadratics in standard form** • **Converting standard form to vertex form** • **Honors: Applications of Quadratic functions** **4.3 Modeling with Quadratic Functions [F-IF5]** • **Writing the equation of a parabola in standard form given points** • **Honors: Comparing quadratic models** • **Honors: Using Quadratic Regression** • **Honors: CB 4.3 Identifying Quadratic Data** **4.4 Factoring Quadratic Expressions [A-SSE2]** • **Factoring quadratic trinomials when a = 1, -1** • **Factoring using common factors** • **Factoring quadratic trinomials when a ≠ 1** • **Factoring perfect square trinomials** • **Factoring a difference of two squares** **4.5 Quadratic Equations [A-CED1] [A-SSE1] [A-SSE1a] [A-APR3]** • **Solving a quadratic equations by factoring** • **Solving a quadratic equation numerically** • **Solving a quadratic equation graphically** • **Honors: Applications of quadratic equations** **4.6 Completing the Square [A-REI4b]** • **Solving an equation by finding square roots** • **Honors: Applications of solving by square roots** • **Solving a perfect square trinomial equation**	

a. Interpret parts of an expression such as terms, factors, and coefficients. [A-SSE1a] **17. 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-APR3]** **1. Know there is a complex number i such that i2 = –1, and every complex number has the form a + bi with a and b real. [N-CN1]** **2. Use the relation $i^2 = –1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. [N-CN2]** **Honors3. Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers. [N-CN3]** **4. Solve quadratic equations with real coefficients that have complex solutions. [N-CN7]** **Honors5. Extend polynomial identities to the complex numbers. [N-CN8]**	• **Completing the Square** • **Solving an equation by completing the square** • **Honors: Using completing the square to convert standard form to vertex form** **4.7 The Quadratic Formula [A-REI4b]** • **Using the quadratic formula** • **Honors: Applications of the quadratic formula** • **Using the discriminant to determine the number of real solutions** • **Honors: Applications of the discriminant** **4.8 Complex Number [N-CN1] [N-CN2] [N-CN3] [N-CN7] [N-CN8]** • **Simplifying complex numbers** • **Graphing a complex number** • **Adding and Subtracting complex numbers** • **Multiplying complex numbers** • **Dividing complex numbers** • **Honors: Factoring using complex conjugates** • **Solving equations involving complex numbers** **4.9 Quadratic Systems [A-CED3] [F-IF9]** • **Solving a linear-quadratic system graphically** • **Solving a linear-quadratic system using substitution** • **Solving a quadratic system of equations algebraically and graphically** • **Solving a system of quadratic inequalities** • **Honors: CB 4.9 Powers of complex numbers** **NMSI** **Another Way to Look at Factoring**	

	Investigation Graphing Quadratic Functions **Taking Care of Business** **Literal Equations and Quadratic Optimization** **Accumulation with quadratics** **Quadratic Optimization** **NMSI** **Analyzing Function** **Behavior Using Graphical Displays** **Quadratic Functions: Adaption of AP Calculus 1997 AB2**	

BENCHMARK 1

Only Power Standards will be tested on the benchmark.

First nine weeks power standards:

32. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

[F-IF9]

30. a. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

[F-IF7b]

21. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

[A-CED2]

34. **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-BF3]

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Algebra II/Trig and Algebra II/Trig Honors

Second Nine Weeks

Polynomials and Polynomial Functions: Chapter 5

Standard	Resources	Pacing Recommendation / Date(s) Taught
6. Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials. [N-CN9] **13. Use the structure of an expression to identify ways to rewrite it. [A-SSE2]** **15.) 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-APR1]** **16. 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-APR2]**	**Sections:** **5.1 Polynomial Functions** • **Classifying Polynomials** • **End Behavior** • **Graphing** • **Honors: Using Differences to Determine Degree** **5.2 Polynomials, Linear Factors, and Zeros** • **Writing a Polynomial in Factored Form** • **Finding Zeros and writing the polynomial** • **Maximum and Minimum** **5.3 Solving Polynomial Equations[A-SSE2]**	**6 Days**

18. Prove polynomial identities and use them to describe numerical relationships. [A-APR4] **Example: The polynomial identity $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples** **19.) 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. [A-APR6]**	• **Solving polynomial equations by factoring and graphing** **5.4 Dividing Polynomials[A-APR6]** • **Using Long Division** • **Using and Applying Synthetic Division [A-APR2]** **5.5 Theorems about Roots of Polynomial Equations** • **Finding Rational Roots** • **Using Rational Root Theorem** • **Using Conjugate Root Theorem** • **Using Descartes' Rule of Signs** **5.5 Concept Byte Using Polynomial Identities [A-APR4]** **5.6 The Fundamental Theorem of Algebra [N-CN9]** • **Using the Fundamental Theorem of Algebra** • **Finding all zeros** **NMSI:** **Graphical Transformations** **Investigating Functions** **Adaptation of AP Calculus 1997 AB1**	

Radical Functions and Rational Exponents: Chapter 6

Standards	Resources	Pacing Recommendation / Date(s) Taught

15. 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-APR7] **21. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. [A-CED2]** **23. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. [A-CED4]** **30. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. [F-IF7]** **30a. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions [F-IF7b]** **33. Write a function that describes a relationship between two quantities. [F-BF1]** **34. 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-BF3]** **12. Interpret expressions that represent a quantity in terms of its context. [A-SSE1]** **a. Interpret parts of an expression such as terms, factors, and coefficients. [A-SSE1a]** **b. Interpret complicated expressions by viewing one or more of their parts as a single entity. [A-SSE1b]**	**Sections:** **6.1 Roots and Radical Expressions [A-SSE2]** • **Finding Roots** • **Simplifying Radicals** • **Using a Radical Expression** **6.2 Multiplying & Diving Radical Expressions [A-APR7]** • **Multiplying Radicals** • **Simplifying Radicals** • **Dividing Radicals** • **Rationalizing the Denominator** **6.3 Binomial Radical Expressions [A-APR7]** • **Adding and Subtracting** • **Using Radical Expressions** • **Multiplying Binomial Radical Expressions** • **Multiplying Conjugates** • **Honors: Rationalizing the denominator** **6.4 Rational Exponents** • **Simplifying with Rational Exponents** • **Converting between Exponential and Radical Forms** • **Using and Simplifying Rational Exponents** **6.5 Solving Square Root and Other Radical Expressions [A-REI2]** • **Solving Radical Equations** • **Extraneous Solutions** • **Honors: Solving with two radicals** **6.6 Function Operations** • **Adding and Subtracting Functions** • **Multiplying and Dividing Functions** • **Composite Functions** **6.7 Inverse Relations and Functions[F-BF4]** • **Find the Inverse** • **Graph the inverse** • **Find an Inverse function** • **Composing Inverse Functions** **6.8 Graphing Radical Functions[F-IF7b]**	**8 days**

13. Use the structure of an expression to identify ways to rewrite it. [A-SSE2] **24. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. [A-REI2]** **27. 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. [A-REI11]** **35. Find inverse functions. [F-BF4]** **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. [F-BF4a]** **Example: *f*(*x*) =2x^3 or** ***f*(*x*) = (*x*+1)/(*x*-1) for *x* ≠ 1.**	• **Translating Square Root Functions** • **Graphing Radical Functions**	

Exponential and Logarithmic Functions: Chapter 7

Standard	Resources	Pacing Recommendation / Date(s) Taught
30c. Graph exponential and logarithmic functions showing intercepts and end behavior; and trigonometric functions, showing period, midline, and amplitude. [F-IF7c] **33. Write a function that describes a relationship between two quantities. [F-BF1]**	**Sections:** **7.1 Exploring Exponential Models[F-IF7c]** • **Graphing Exponential Functions** • **Exponential Growth and Decay** • **Writing an Exponential Function** **7.2 Properties of Exponential Functions[F-IF7c]** • **Graph y=ab^x** • **Using Exponential Models**	**6 days**

33a. Combine standard function types using arithmetic operations. [F-BF1b] **Example for 33a: 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 mode** **30.) Graph functions expressed symbolically, and show key features of the graph, by hand in simple cases and using technology for more complicated cases. [F-IF7]** **36.) 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-LE4]**	• **Evaluating e^x** • **Continuous Compound Interest** **7.3 Logarithmic Functions as Inverses** • **Writing Exponential in Logarithmic Form** • **Evaluating Logarithms** • **Using a Logarithmic Scale** • **Graphing Logarithms** **7.4 Properties of Logarithms[F-LE4]** • **Simplifying Logarithms** • **Expanding Logarithms** • **Using Change of Base Formula** • **Using a Logarithmic Scale** **7.5 Exponential and Logarithmic Equations[F-LE4]** • **Solving Exponential Equations** • **Solving Logarithmic Equations** **7.6 Natural Logarithms[F-LE4]** • **Simplifying Natural Logs** • **Solving Natural Log Equations** • **Solving Exponential Equations** • **Using Natural Logs** **NMSI:** **And So They Grow** **Graphing Exponential and Logarithmic Functions** **Exponential and Log Laws** **Solving Systems of Exponential, Logarithmic, and Linear Equations** **Exponential and Natural Log Functions** **Linearization of Exponential, Logarithmic, and Linear Equations**	

	Motion Problems Using Exponential and Natural Logarithmic Functions **Curing the Sniffles**	

Second nine weeks power standards:

30c. **Graph exponential and logarithmic functions showing intercepts and end behavior; and trigonometric functions, showing period, midline, and amplitude.**

[F-IF7c]

15. **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-APR7]

18. **Prove polynomial identities and use them to describe numerical relationships.**

[A-APR4]

6. **Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.**

[N-CN9]

Algebra II/Trig and Algebra II/Trig Honors

Third Nine Weeks

3rd Nine Weeks—Chapter 8, Chapter 9, Chapter, 10, Chapter 12

Rational Functions: Chapter 8

Standards	Resources	Pacing Recommendation / Date(s) Taught
15.) 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-APR7] 21. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. [A-CED2] 23. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. [A-CED4] 30. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. [F-IF7] 33. Write a function that describes a relationship between two quantities. [F-BF1] 34. 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-BF3]	Sections: 8.1 Inverse Variation [A-CED2] [A-CED4] • Differentiate between direct and inverse variation on a table and graph • Write function that models inverse variation • Use combined variation 8.2 The Reciprocal Function Family [A-BF3] [A-CED2] [A-APR1] • Identify domain, range, vertical and horizontal asymptotes of translated functions • Write the equation of a transformation 8.3 Rational Functions and Their Graphs [F-IF7] [F-BF1] • Find points of discontinuity • Find vertical and horizontal asymptotes 8.4 Rational Expressions [A-SSE2] [A-SSE1b] [A-SSE1a] • Simplifying, multiplying, dividing rational expressions 8.5 Adding and Subtracting Rational Expressions [A-APR7] • Adding and subtracting rational expressions • Simplify a complex fraction	6 Days

12. Interpret expressions that represent a quantity in terms of its context. [A-SSE1] **c. Interpret parts of an expression such as terms, factors, and coefficients. [A-SSE1a]** **d. Interpret complicated expressions by viewing one or more of their parts as a single entity. [A-SSE1b]** **13. Use the structure of an expression to identify ways to rewrite it. [A-SSE2]** **27. 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. [A-REI11]** **35. Find inverse functions. [F-BF4]** **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. [F-BF4a]** **Example: *f*(*x*) =2x^3 or** ***f*(*x*) = (*x*+1)/(*x*-1) for *x* ≠ 1.**	**8.6 Solving Rational Expressions [A-APR7] [A-APR6] [A-CED1] [A-REI11]** • **Find the solutions to rational equations** **NMSI** **(RF - Rational Function)** **RF Exploration** **RF Long Run** **RF Short Run** **RF with removable discontinuities** **Transformation of RF**	

Sequences and Series: Chapter 9

Standards	Resources	Pacing Recommendation / Date(s) Taught
14. 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. [A-SSE4]	**Sections:** **9.1 Mathematical Patterns [A-SSE4]** • **Predict the following terms in a sequence**	**5 Days**

	• Write an explicit formula for a sequence • Write a recursive definition of a sequence **9.2 Arithmetic Sequence [F-IF3]** • Determine if a sequence is arithmetic • Find the common difference • Find the nth term **9.3 Geometric Sequence [A-SSE4]** • Determine if a sequence is geometric • Find the common ratio • Find the nth term **9.4 Arithmetic Series [F-IF3]** • Find the sum of a finite arithmetic series • Honors : Write a series in summation notation **9.5 Geometric Series [A-SSE4]** • Find the sum of a finite geometric series • Honors: Determine if a series converges or diverges NMSI Unit 2 first part - arithmetic sequences and series(important to make connections between arithmetic sequences and linear functions) NMSI Unit 5 last part on geometric sequences and series	

Conic Sections: Chapter 10

Standards	Resources	Pacing Recommendation / Date(s) Taught

28. Create graphs of conic sections, including parabolas, hyperbolas, ellipses, circles, and degenerate conics, from second-degree equations. (Alabama) **a. Formulate equations of conic sections from their determining characteristics. (Alabama)** **Example: Write the equation of an ellipse with center (5, -3), a horizontal major axis of length 10, and a minor axis of length 4.** **29. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. [F-IF5]** **30. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. [F-IF7]** **31. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. [F-IF8]** **34. 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-BF3]**	**Sections:** **10.2 Parabolas [G-GPE2]** • **Find the vertex, axis of symmetry, focus and directrix** • **Identify characteristics of parabolas in both standard and vertex form** • **Write equation of a parabola in vertex form given vertex and translations** • **Honors: Convert from standard to vertex form by completing the square** **10.3 Circles [G-GPE1]** • **Write equation of a circle given center and radius** • **Use translations to write and equation** • **Find center and radius given the equation** **10.4 Ellipses [G-GPE3]** • **Identify the components of an ellipse** • **Write an equation in standard form** • **Find the foci** **10.5 Hyperbolas [G-GPE3]** • **Identify vertices, transverse axis and axis of symmetry** • **Write equation of hyperbola** • **Analyze characteristics of a hyperbola given its equation** **NMSI** **Transformations of Conic Sections**	**4 Days**

Matrices: Chapter 12

Standards	Resources	Pacing Recommendation / Date(s) Taught
7. Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network. *(Use technology to approximate roots.)* [N-VM6] **8. Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled. [N-VM7]** **9. Add, subtract, and multiply matrices of appropriate dimensions. [N-VM8]** **10. Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties. [N-VM9]** **11. 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. [N-VM10]** **26. Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3 × 3 or greater). [A-REI9]**	**Sections** **12.1 Add and Subtract Matrices [N-VM8]** • **Add matrices** • **Subtract matrices** • **Solve a matrix equation** • **Find unknown matrix values** **12.2 Matrix Multiplication [N-VM6] [N-VM7] [N-VM8] [N-VM9]** • **Scalar multiplication** • **Matrix multiplication** • **Determine if matrix multiplication is possible based on matrix dimensions** **12.3 Determinants and Inverses [N-VM10] [N-VM12]** • **Determine if a matrix is an inverse** • **Find the determinant of 2x2 and 3x3 matrices** • **Honors:Find the inverse of a matrix** **12.4 Inverse Matrices and Systems [N-VM8]** • **Write and solve a system of equations as a matrix equation** **NMSI –Unit 2**	**4 Days**

BENCHMARK 3

Only Power Standards will be tested on the benchmark.

Third nine weeks power standards:

15.) **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-APR7]

13. **Use the structure of an expression to identify ways to rewrite it.**

[A-SSE2]

14. **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.**

[A-SSE4]

29a. **Formulate equations of conic sections from their determining characteristics. (Alabama)**

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

[F-IF8]

9. **Add, subtract, and multiply matrices of appropriate dimensions.**

[N-VM8]

Huntsville City Schools

2016 – 2017 Pacing Guide

Algebra II/Trig and Algebra II/Trig Honors

Fourth Nine Weeks

4th Nine Weeks—Chapter 11, Chapter 13 and Chapter 14

Probability and Data Analysis: Chapter 11

Standard	Resources	Pacing Recommendation / Date(s) Taught
13. Know 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. (The Binomial Theorem can be proved by mathematical induction or by a combinatorial argument.) [A-APR5] **37. Use the mean and standard deviation of 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 [S-ID4]** **Honors 41. Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator). [S-MD6]** **Honors 42. Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game). [S-MD7]** **43. 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‖). [S-CP1]** **45. 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. [S-CP4]** **Example: Collect data from a random sample of students in your school on their favorite subject among mathematics, 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.**	**Sections:** **11.1 Permutations and Combinations[S-CP9]** • **Fundamental Counting Principal** • **Permutations** • **Combinations** **11.2 Probability** • **Experimental Probability** • **Using a Simulation** • **Theoretical Probability** • **Honors: Probability Using Combinatorics** **11.3 Probability of Multiple Events[S-CP1] [S-CP4] [S-CP5] [S-CP6][S-CP8]** • **Independent and Dependent Events** • **Probability of Independent Events** • **Mutually Exclusive Events** • **Finding Probability of Mutually Exclusive Events** • **Finding Probability** **11.4 Conditional Probability[S-CP1] [S-CP4][S-CP5] [S-CP6][S-CP8] [S-CP3]** • **Finding Conditional Probability** • **Using the Conditional Probability Formula** • **Using a Tree Diagram** **11.5 Probability Models[S-MD6][S-MD7]** • **Making Fair Decisions** • **Using Random Numbers** • **Modeling with a Simulation** • **Using Probability to Analyze Decisions** **11.6 Analyzing Data[S-MD6]** • **Measures of Central Tendency** • **Outliers** • **Comparing Data Sets** • **Box-and-Whisker Plots**	**10 Days**

46. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. [S-CP5] **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.** **50. Use permutations and combinations to compute probabilities of compound events and solve problems. [S-CP9]** **48. 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. [S-CP7]** **49. Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model. [S-CP8]** **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. [S-CP2]** **44. 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. [S-CP3]** **47. 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. [S-CP6]**	• **Finding Percentiles** **11.7 Standard Deviation[S-ID4]** • **Finding Variance and Standard Deviation** • **Using Standard Deviation to Describe Data** **Honors: 11.8 Samples and Surveys** **Honors: 11.9 Binomial Distributions [S-CP9]** **11.10 Normal Distributions[S-ID4]** • **Normal Distributions** • **Analyzing Normally Distributed Data** • **Sketching a Normal Curve** **NMSI:** Calculate Probabilities with Tree Diagrams Independence Probability Using Sample Spaces, Permutations, and Combinations	

Periodic Functions and Trigonometry: Chapter 13

Standards	Resources	Pacing Recommendation / Date(s) Taught
37. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. [F-TF1] **38. 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-TF2]** **39. Define the six trigonometric functions using ratios of the sides of a right triangle, coordinates on the unit circle, and the reciprocal of other functions. [F-TF4]** **40. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. [F-TF5]** **30 c. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. [F-IF7e]**	**Sections** **13.1 Periodic Data [F-IF4]** • **Identify cycles and periods** • **Determine if a function is periodic** • **Find amplitude and midline** **13.2 Angles and the Unit Circle [F-TF2]** **13.3 Radian Measure [F-TF1]** • **Measure angles from standard position** • **Identify coterminal angles** • **Find sine and cosine of angles (using degrees)** • **Convert between radians and degrees** • **Find sine and cosine of radian measure** • **Find the length of an arc** **13.4 The Sine Function** **13.5 The Cosine Function [F-TF2] [F-IF4] [F-IF7e] [F-TF5]** • **Estimate sine and cosine values graphically** • **Find the period of a sine and cosine curve** • **Find the amplitude of a sine and cosine curve** • **Sketch a graph of sine and cosine functions** **13.6 Tangent Function [F-IF7e] [F-TF2] [F-TF5]** **13.7 Translating Sine and Cosine Functions [F-TF5] [F-IF7e]** • **Find tangent geometrically using values from the unit circle** • **Identify phase shifts and translations of parent functions** • **Write equations that model translations**	**5 Days** ****A few extra days in Chapter 13 are accounted for to integrate some of chapter 14 with Chapter 13 to prepare for the EOC. If you do not teach any of chapter 14, chapter 13 should not take all 11 days.**

	13.8 Reciprocal Trigonometric Functions [F-IF7e] • **Find exact values geometrically** **NMSI** **A transformation story (not trig, but will help with transformations of all kinds of graphs and could be extended to trig graphs.)**	

Trigonometric Identities and Equations: Chapter 14

Standards	Resources	Pacing Recommendation / Date(s) Taught
37. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. [F-TF1] **38. 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-TF2]** **39. Define the six trigonometric functions using ratios of the sides of a right triangle, coordinates on the unit circle, and the reciprocal of other functions. [F-TF4]**	**Sections:** **14.1 Trigonometric Identities** • **Verifying identities** • **Using Pythagorean Identity** **14.2 Solving Trigonometric Equations Using Inverses** • **Finding Inverses** • **Solving Trigonometric Equations** • **Solving by Factoring** **14.3 Right Triangles and Trigonometric Ratios [F-TF4]** • **Finding Trigonometric Ratios** • **Finding Angle Measure** • **Using the Inverse of a Trig Function** **14.4 Area and the Law of Sines** • **Finding the Area of a Triangle** • **Finding sides and angles of a Triangle** **14.5 Law of Cosines** • **Using Law of Cosines** • **Finding an Angle Measure**	**6 days**

	***If time allows then an introduction to the Angle Identities for Trigonometry is suggested** **Honors** **14.6 Angle Identities** **14.7 Double-Angle and Half-Angle Identities**	

Fourth nine weeks power standards:

37. **Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.**

[F-TF1]

38. **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-TF2]

39. **Define the six trigonometric functions using ratios of the sides of a right triangle, coordinates on the unit circle, and the reciprocal of other functions.**

[F-TF4]

50. **Use permutations and combinations to compute probabilities of compound events and solve problems.**

[S-CP9]

Alabama Technology Standards Ninth – Twelfth Grade

Operations and Concepts

Students will:

1. Diagnose hardware and software problems.
   Examples: viruses, error messages
   Applying strategies to correct malfunctioning hardware and software
   Performing routine hardware maintenance
   Describing the importance of antivirus and security software

2. Demonstrate advanced technology skills, including compressing, converting, importing, exporting, and backing up files.
   Transferring data among applications
   Demonstrating digital file transfer
   Examples: attaching, uploading, downloading

3. Utilize advanced features of word processing software, including outlining, tracking changes, hyperlinking, and mail merging.

4. Utilize advanced features of spreadsheet software, including creating charts and graphs, sorting and filtering data, creating formulas, and applying functions.

5. Utilize advanced features of multimedia software, including image, video, and audio editing.

Digital Citizenship

9. Practice ethical and legal use of technology systems and digital content.
   Explaining consequences of illegal and unethical use of technology systems and digital content
   Examples: cyberbullying, plagiarism
   Interpreting copyright laws and policies with regard to ownership and use of digital content
   Citing sources of digital content using a style manual
   Examples: Modern Language Association (MLA), American Psychological Association (APA)

Research and Information Fluency

11. Critique digital content for validity, accuracy, bias, currency, and relevance.

Communication and Collaboration

12. Use digital tools to publish curriculum-related content.
    Examples: Web page authoring software, coding software, wikis, blogs, podcasts

13. Demonstrate collaborative skills using curriculum-related content in digital environments.

Examples: completing assignments online; interacting with experts and peers in a structured, online learning environment

Critical Thinking, Problem Solving, and Decision Making

14. Use digital tools to defend solutions to authentic problems.
    Example: disaggregating data electronically

Creativity and Innovation

15. Create a product that integrates information from multiple software applications.
    Example: pasting spreadsheet-generated charts into a presentation