ALGEBRA II/TRIGONOMETRY CURRICULUM GUIDE

Overview and Scope & Sequence

Loudoun County Public Schools
2017-2018

(Additional curriculum information and resources for teachers can be accessed through CMS and VISION)

Algebra II/Trigonometry Nine Week Overview Addendum

1st Quarter		2nd Quarter	
Unit 1-Classroom Routines: Process Goals: Classroom Routines **AII.3** *Algebraic properties & classifying numbers* **AII.11** *Standard deviation & z-scores* **AII.10** *Direct & joint variation* **Unit 2-Investigating Characteristics of Functions:** **AII.9** Curve of best fit **AII.7** Function families AII.7a – *Analyze the continuity of functions (2016)* AII.7c – *Determine the extrema of a function (2016)* AII.7f – *Determine values of a function for elements in its domain (2016)* AII.7g – *Make connections between and among multiple representations of a function (2016)* **AII.8** Relationship between zeros, x-intercepts, and solutions **Unit 3-Absolute Value** **AII.6** Absolute value function families & transformational graphing **AII.7** Graphs of absolute value functions AII.7a – *Analyze the continuity of functions (2016)* AII.7c – *Determine the extrema of a function (2016)*	AII.7f – *Determine values of a function for elements in its domain (2016)* AII.7g – *Make connections between and among multiple representations of a function (2016)* **AII.8** Relationships between solutions, zeros, and x-intercepts **AII.4** Absolute value equations and inequalities **Unit 4 – Quadratics** **AII.9** Curve of best fit (quadratic) **AII.6** Quadratic function families **AII.7** Graphs of quadratic functions & transformational graphing & composite functions **AII.8** Relationships between solutions, zeros, roots, and x-intercepts **AII.4** Solve quadratic equations graphically	**Unit 1-Classroom Routines:** **AII.1** *Simplifying expressions* **AII.2** *Arithmetic Sequences & Series* **Unit 5 – Higher order polynomials** **AII.9** Curve of best fit (higher order polynomial) **AII.6** Polynomial function families (higher order -even & odd degree) **AII.7** Graphs of higher order polynomial functions AII.7a – *Analyze the continuity of functions (2016)* AII.7c – *Determine the extrema of a function (2016)* AII.7f – *Determine values of a function for elements in its domain (2016)* AII.7g – *Make connections between and among multiple representations of a function (2016)* **AII.8** Relationships between solutions, zeros, roots, and x-intercepts **AII.1** Factor polynomials completely **Unit 6 – Radical Functions** **AII.1** Simplify radical expressions **AII.6** Radical function families (square root and cube root) **AII.7** Graphs of radical functions & transformational graphing AII.7a – *Analyze the continuity of functions (2016)* AII.7c – *Determine the extrema of a function (2016)* AII.7f – *Determine values of a function for elements in its domain (2016)*	AII.7g – *Make connections between and among multiple representations of a function (2016)* **AII.4** Solve radical equations graphically and algebraically **AII.7** Composite functions AII.7a – *Analyze the continuity of functions (2016)* AII.7c – *Determine the extrema of a function (2016)* AII.7f – *Determine values of a function for elements in its domain (2016)* AII.7g – *Make connections between and among multiple representations of a function (2016)* **Unit 7-Rational Functions** **AII.9** Curve of best fit (rational) **AII.10** Inverse variation **AII.6** Rational function families **AII.7** Graphs of rational functions AII.7a – *Analyze the continuity of functions (2016)* AII.7c – *Determine the extrema of a function (2016)* AII.7f – *Determine values of a function for elements in its domain (2016)* AII.7g – *Make connections between and among multiple representations of a function (2016)* **AII.4** Solve rational equations graphically and algebraically. **AII.1** Simplifying rational expressions
24 blocks		**21 blocks**	

3rd **Quarter**	4th **Quarter** **Addendum**
Unit 1-Classroom Routines:	***Unit 1-Classroom Routines:***
***AII.12** Permutations and Combinations*	*Spiral review of previous topics*
***AII.1** Factor polynomials completely*	*Review all regressions, parent functions*
***AII.11** Normal Distribution*	
	Unit 10 – Trigonometric Functions & Graphs (Continued from Q3)
Unit 8- Exponential functions	T.6
AII.9 Curve of best fit (exponential)	
AII.6 Exponential function families	**Unit 11 – Trigonometric Identities & Equations**
AII.7 Graphs of exponential functions	T.4
	T.5
AII.7a *– Analyze the continuity of functions (2016)*	T.7
AII.7c *– Determine the extrema of a function (2016)*	T.8
AII.7f *– Determine values of a function for elements in its domain (2016)*	T.9
AII.7g *– Make connections between and among multiple representations of a function (2016)*	
	Curriculum completed by 5/25/18
AII.2 Geometric sequences and series	
	Post SOL Topics
Unit 9 – Logarithmic Functions	• Advanced Algebra Preparation
AII.9 Curve of best fit (logarithmic)	
AII.6 Logarithmic function families	
AII.7 Graph of logarithmic functions	
AII.7a *– Analyze the continuity of functions (2016)*	
AII.7c *– Determine the extrema of a function (2016)*	
AII.7f *– Determine values of a function for elements in its domain (2016)*	
AII.7g *– Make connections between and among multiple representations of a function (2016)*	
AII.7 Verify relationship between exponential functions and logarithmic functions graphically	
Unit 1 – Wrapping up Classroom Routines	
AII.2 Sequences and Series	
AII.11 Normal distribution	
AII.10 Direct, joint, & inverse variation	
AII.12 Permutations and combinations	
Unit 10 – Trigonometric Functions & Graphs (Continued into Q4)	
T.1	
T.2	
T.3	
21 blocks	**23 blocks**

Scope & Sequence

Quarter 1: 24 blocks total

*The recommended pacing is based on the assumption that SOL testing will take place in early May. Time for classroom assessments is included within the suggested pacing for each unit.

*Number of blocks	Standard	Reporting Category	Topic

*Number of blocks	Standard	Reporting Category	Topic
			Unit 1 – Classroom Routines (Process Goals: Classroom Routines)
Entire Quarter	*AII.3*	*Expressions and Operations*	• *Field properties that apply to complex numbers* • *Number system and subsets of numbers*
	AII.11	*Statistics*	• *Standard deviation and z-scores*
	AII.10	*Statistics*	• *Direct and joint variation*
			Unit 2 – Investigating Characteristics of Functions
			In this unit, students will identify characteristics of relations (all types of relations and functions) given a graphical representation. Students will be making connections between the multiple representations of relations and functions.
4	AII.9	Statistics	• The student will analyze data <u>in graphical form</u> in order to make predictions and solve real world problems.
	AII.7a-g	Functions	• Investigate and analyze a variety of functions and relations <u>using the graphical representations</u> of the relation. Include piecewise, step, restricted domain/range, etc… • <u>Using graphical representations, sets of ordered pairs, and tables of values</u>, determine whether a relation is a function, identify the domain, range, zeros of a function, the x and y intercepts, intervals where the function is increasing and decreasing, asymptotes, other discontinuities, and end behavior. Use a variety of relations. Express characteristics in both interval notation and set builder notation. • Recognize inverse functions are reflections of the function over the line $y = x$.
	AII.8	Functions	• <u>Using graphical representations</u>, investigate and describe the relationship between zeros, x-intercepts, and solutions to various functions.
			Unit 3 – Absolute Value
			Students should investigate the characteristics of absolute value functions as a function family, graphically, <u>and then</u> explore solving absolute value equations and inequalities algebraically. Students should be using multiple representations to justify their work.**
6	AII.6	Functions	• Investigate absolute value graphs, including real world situations/data that model absolute value functions, and recognizing piecewise functions. • Describe graphs of absolute value functions as transformations of the parent function.
	AII.7 a-d,f,g	Functions	• Investigate and analyze absolute value functions using graphical representations. • Identify the domain, range, zeros of a function, the x and y intercepts, intervals where the function is increasing and decreasing, and end behavior, <u>graphically first then algebraically</u>.
	AII.8	Functions	• Investigate relationships between solutions, zeros, and x-intercepts of absolute value functions, <u>graphically first then algebraically</u>. Make connections to unit 2.
	AII.4a	Equations and Inequalities	• Solve absolute value equations and inequalities graphically first then algebraically. Express characteristics in both interval notation and set builder notation.

			Unit 4 – Quadratics
Students should investigate the characteristics of quadratic functions as a function family, graphically, <u>and then</u> explore solving quadratic equations algebraically. Students should use multiple representations to justify their work. For Algebra II/Trig, it is recommended that portions of this unit is taught without graphing calculators or with limited graphing calculator use.
12	AII.9	Statistics	• Investigate and analyze real world data modeling quadratic functions. (Review from Algebra I) • Finding curves of best fit for real world situations that model quadratic functions.
	AII.6	Functions	• Investigate quadratic functions using graphical representations. Use transformational graphing to graph quadratic functions.
	AII.7	Functions	• Investigate and analyze quadratic functions graphically. Introduce standard form, intercept form, and vertex form. • Identify the domain, range, zeros of a function, the x and y intercepts, intervals where the function is increasing and decreasing, and end behavior, <u>graphically and algebraically</u>. Express characteristics in both interval notation and set builder notation. • Investigate composite functions, beginning with linear and quadratic functions.
	AII.8	Functions	• Investigate relationships between solutions, zeros, roots, and x-intercepts of a quadratic function, <u>graphically first then algebraically</u>. Make connections to unit 2.
	AII.4b	Equations and Inequalities	• Solve quadratic equations <u>graphically</u>. • If time permits, include solving quadratic inequalities graphically and algebraically.
	AII.1d	Expressions and Operations	• Factor quadratic expressions and equations completely (make connections to factoring in Algebra I)
	AII.7	Functions	• Investigate and analyze quadratic functions using multiple representations. • Make connections between the common forms of quadratic equations (standard, intercept, vertex forms) • Investigate composite functions, beginning with linear and quadratic functions.
	AII.4b	Equations and Inequalities	• Solve quadratic equations over the set of complex numbers, graphically and algebraically, using a variety of methods including factoring, inverse operations (i.e. using square roots), quadratic formula, and completing the square. • Justify which method is most efficient for specific situations.
	AII.3	Equations and Inequalities	• Complex numbers, operations on complex numbers, simplifying radical expressions containing negative rational numbers, identify field properties that are valid for the complex numbers
	AII.5	Equations and Inequalities	• Solve nonlinear systems graphically and algebraically. • Include linear-quadratic system of two equations and quadratic-quadratic system of two equations. • Solve systems with 0, 1, 2, 3, or 4 solutions
2*		• **Quarterly Assessments, Remediation, and Intervention**

*These blocks reserved for quarterly assessments, remediation, and intervention should be dispersed throughout the quarter as needed.

Quarter 2: 21 blocks total

*The recommended pacing is based on the assumption that SOL testing will take place in early May. Time for classroom assessments is included within the suggested pacing for each unit.

*Number of blocks	Standard	Reporting Category	Topic
			Unit 1 – Classroom Routines
Entire Quarter	_AII.1bc_	_Expressions and Operations_	• _Simplify radical expressions_ • _Review laws of exponents; operations with polynomial expressions_
	AII.2	_Functions_	• _Investigate and apply the properties of arithmetic and geometric sequences and series to solve real world problems._
			Unit 5 – Higher Order Polynomials
Students should investigate the characteristics of polynomial functions as a function family, graphically, _and then_ explore solving polynomial equations algebraically. Students should be using multiple representations to justify their work. For Algebra II/Trig, it is recommended that portions of this unit is taught without graphing calculators or with limited graphing calculator use.			
7	AII.9	Statistics	• Analyze real world data that can be modeled with higher order polynomial relations
	AII.6	Functions	• Recognize general shapes of higher order polynomials and explore the end behavior based on the degree of the function and the leading coefficient. • Explore transformational graphing for cubic functions.
	AII.7a-f,h	Functions	• Investigate and analyze higher order polynomial functions graphically. • Identify the domain, range, zeros of a function, the x and y intercepts, intervals where the function is increasing and decreasing, and end behavior, <u>graphically and algebraically</u>. Express characteristics in both interval notation and set builder notation. • Spiral in composite functions to include polynomial functions. • Explore why discontinuities do not occur in polynomial functions.
	AII.8	Functions	• Describe relationships among solutions, zeros, x-intercepts, and factors of higher order polynomial functions. Solve polynomials graphically and algebraically using a variety of methods including factoring, long division, and synthetic division.
	AII.1d	Expressions and Operations	• Factor polynomial expressions completely

*Number of blocks	Standard	Reporting Category	Topic
			Unit 6 – Radical Functions
			Students should investigate the characteristics of radical functions as a function family, graphically, <u>and then</u> explore solving radical equations algebraically. Students should be using multiple representations to justify their work.**
4	AII.1b, c	Expressions and Operations	• Simplify radical expressions. Be sure to include the nth root, rationalizing denominator, and combining like terms
	AII.6	Functions	• Investigate transformational graphing with radical functions
	AII.7a-f	Functions	• Investigate and analyze graphs of radical functions. • Identify the domain, range, zeros of a function, the x and y intercepts, intervals where the function is increasing and decreasing, and end behavior, <u>graphically and algebraically</u>. Express characteristics in both interval notation and set builder notation.
	AII.4d	Equations and Inequalities	• Solve radical equations graphically and algebraically
	AII.7g, h	Functions	• Find the inverse of functions (include multiple types of functions). Connect back to Unit 2 by exploring the graphical relationship of a function and its inverse. • Investigate composite functions and verify inverse functions using composites.
			Unit 7 – Rational Functions
			Students should investigate the characteristics of rational functions as a function family, graphically, <u>and then</u> explore solving rational equations algebraically. Students should be using multiple representations to justify their work.
8	AII.10	Statistics	• Inverse variation and include real world situations.
	AII.6	Functions	• Investigate rational function families and transformational graphing
	AII.7a-f	Functions	• Investigate and analyze rational functions graphically first, then algebraically. • Identify the domain, range, zeros of a function, the x and y intercepts, intervals where the function is increasing and decreasing, asymptotes and other discontinuities, and end behavior, <u>graphically and algebraically</u>. Express characteristics in both interval notation and set builder notation. • Include oblique asymptotes and removable discontinuities
	AII.4c	Equations and Inequalities	• Solve rational equations graphically and algebraically
	AII.1a	Expressions and Operations	• Simplify and perform operations with rational algebraic expressions • Stress complex fractions
2*			• **Quarterly Assessments, Remediation, and Intervention**

*These blocks reserved for quarterly assessment, remediation, and intervention should be dispersed throughout the quarter as needed.

Quarter 3: 21 blocks total

*The recommended pacing is based on the assumption that SOL testing will take place in early May. Time for classroom assessments is included within the suggested pacing for each unit.

*Number of blocks	Standard	Reporting Category	Topic
		Unit 1 – Classroom Routines	
Entire quarter	*AII.12*	*Statistics*	• *Permutations and combinations*
	AII.1d	*Expressions and Operations*	• *Factoring polynomial expressions completely*
	AII.11	*Statistics*	• *Normal distribution*
		Unit 8 – Exponential Functions	
Students should investigate the characteristics of exponential functions as a function family, graphically. Students should be using multiple representations to justify their work. Solving exponential functions algebraically is a post-SOL topic.			
5	AII.9	Statistics	• Collect and analyze data modeling exponential functions and determine the curve of best fit
	AII.6	Functions	• Investigate exponential function families and transformational graphing
	AII.7a-f	Functions	• Investigate and analyze exponential functions and solve graphically. • Identify the domain, range, zeros of a function, the x and y intercepts, intervals where the function is increasing and decreasing, asymptotes, and end behavior, <u>graphically</u>. Express characteristics in both interval notation and set builder notation.
	AII.2	Functions	• Geometric sequences and series
		Unit 9 – Logarithmic Functions	
Students should investigate the characteristics of logarithmic functions as a function family, graphically. Students should be using multiple representations to justify their work. Solving logarithmic functions algebraically is a post-SOL topic.			
4	AII.9	Statistics	• Collect and analyze data modeling logarithmic functions and determine the curve of best fit
	AII.6	Functions	• Investigate logarithmic function families and transformational graphing
	AII.7a-g	Functions	• Investigate and analyze logarithmic functions and solve graphically. • Verify the inverse relationship between exponential functions and logarithmic functions graphically. • Identify the domain, range, zeros of a function, the x and y intercepts, intervals where the function is increasing and decreasing, asymptotes, and end behavior, <u>graphically</u>. Express characteristics in both interval notation and set builder notation. • Stress expand/condense skills • Solve equations with different bases on each side: $2^{x+4} = 5^{x-1}$ • Include problem solving with logarithms
		Unit 1 – Wrapping up the Classroom Routines	
5	AII.2	Functions	• Sequences and series
	AII.11	Statistics	• Normal distribution
	AII.10	Statistics	• Direct, joint, and inverse variation
	AII.12	Statistics	• Permutations and combinations

*Number of blocks	Standard	Reporting Category	Topic
unit			
		Unit 10 – Trigonometric Functions & Graphs (Continues into Quarter 4)	
5	T.1 T.2 T.3	Triangular and Circular Trigonometric Functions	• Right Triangle Trigonometry • Unit Circle • Understand relationship between special right triangles and unit circle
2*	**Quarterly Assessments, Remediation, and Intervention**		

* The number of blocks reserved for assessment, remediation, and intervention should be dispersed throughout the quarter as needed.

Quarter 4: 23 blocks total

*The recommended pacing is based on the assumption that SOL testing will take place in early May. Time for classroom assessments is included within the suggested pacing for each unit.

Number of blocks	Standard	Reporting Category	Topic
	**_Unit 1 – Classroom Routines_**
Entire Quarter	*AII.9*		• *Regressions*
	AII.6		• *Parent functions and transformations*
			• *Mixed review*
	**_Unit 10 – Trigonometric Functions & Graphs (Continued from Quarter 3)_**
6	T.6	Trigonometric Equations, Graphs, & Practical Problems	• Graphing: Sine/Cosine; Tangent/Cotangent; Secant/Cosecant • Understand transformational graphing without a calculator
	**_Unit 11 – Trigonometric Identities & Equations_**
2	T.5	Trigonometric Identities	• Verify and Establish Trigonometric Identities
2	T.7 T.4	Inverse Trigonometric Functions	• Inverse Trigonometric Functions
3	T.8	Trigonometric Equations, Graphs, & Practical Problems	• Solve Trigonometric Equations • Write and Model Trigonometric Equations
2	T.5	Trigonometric Identities	• Sum and Difference Formulas • Double-Angle & Half Angle Formulas
2	T.9	Trigonometric Equations, Graphs, & Practical Problems	• Laws of Sines • Laws of Cosines
6*		**Quarterly Assessments, Remediation, and Intervention, and SOL Testing**

* The number of blocks reserved for assessment, remediation, and intervention should be dispersed throughout the quarter as needed.

Additional information about the Standards of Learning can be found in the

VDOE 2009 Curriculum Framework (Algebra II)

VDOE 2009 Curriculum Framework (Trigonometry)

VDOE 2016 Curriculum Framework (Algebra II)
VDOE 2016 Curriculum Framework (Trigonometry)
(click links above)

Additional information about math vocabulary can be found in the

VDOE Vocabulary Word Wall Cards

(click link above)