



ALGEBRA II
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 Nine Week Overview **Addendum**

1 st Quarter		2 nd Quarter	
<p><u>Unit 1-Classroom Routines:</u> <u>Process Goals: Classroom Routines</u> Review algebraic expressions. Review basic factoring.</p> <p><u>Unit 1A-Review Key Algebra Concepts</u> <u>All.3</u> Algebraic properties & classifying numbers <u>All.1</u> Simplifying expressions</p> <hr/> <p><u>Unit 2-Investigating Characteristics of Functions:</u> <u>All.9</u> Curve of best fit <u>All.7</u> Function families <u>All.7a</u> – Analyze the continuity of functions (2016) <u>All.7c</u> – Determine the extrema of a function (2016) <u>All.7f</u> – Determine values of a function for elements in its domain (2016) <u>All.7g</u> – Make connections between and among multiple representations of a function (2016) <u>All.8</u> Relationship between zeros, x-intercepts, and solutions</p> <p><u>Unit 3-Absolute Value</u> <u>All.6</u>Absolute value function families & transformational graphing <u>All.7</u>Graphs of absolute value functions <u>All.7a</u> – Analyze the continuity of functions (2016)</p>	<p><u>All.7c</u> – Determine the extrema of a function (2016) <u>All.7f</u> – Determine values of a function for elements in its domain (2016) <u>All.7g</u> – Make connections between and among multiple representations of a function (2016) <u>All.8</u> Relationships between solutions, zeros, and x-intercepts <u>All.4</u> Absolute value equations and inequalities</p> <p><u>Unit 4 – Quadratics</u> <u>All.6</u>Quadratic function families <u>All.7</u>Graphs of quadratic functions & transformational graphing & composite functions <u>All.7a</u> – Analyze the continuity of functions (2016) <u>All.7c</u> – Determine the extrema of a function (2016) <u>All.7g</u> – Make connections between and among multiple representations of a function (2016) <u>All.8</u> Relationships between solutions, zeros, roots, and x-intercepts <u>All.4</u>Solve quadratic equations graphically</p> <p>*Quarterly assessment will include quarter 1 content from:<u>All.1</u>, <u>All.3</u>, <u>All.4a,b</u>, <u>All.6</u>, <u>All.7a-h</u>, <u>All.8</u>, <u>All.9</u></p>	<p><u>Unit 1-Classroom Routines:</u> <u>All.1</u> Factor polynomials completely</p> <p>Review laws of exponents. Review simplifying square and cube roots.</p> <hr/> <p><u>Unit 4 – Quadratics (continued)</u> <u>All.1</u>Factor quadratics completely <u>All.4</u> Solve quadratic equations algebraically <u>All.3</u> Complex numbers <u>All.9</u> Curve of best fit (quadratic) <u>All.5</u> Solve nonlinear systems of equations graphically & algebraically <u>All.9</u> Curve of best fit (quadratic)</p> <p><u>Unit 5 – Higher order polynomials</u> <u>All.9</u> Curve of best fit (higher order polynomial) <u>All.6</u> Polynomial function families (higher order -even & odd degree) <u>All.7</u>Graphs of higher order polynomial functions <u>All.7a</u> – Analyze the continuity of functions (2016) <u>All.7c</u> – Determine the extrema of a function (2016) <u>All.7f</u> – Determine values of a function for elements in its domain (2016) <u>All.7g</u> – Make connections between and among multiple representations of a function (2016)</p>	<p><u>All.8</u> Relationships between solutions, zeros, roots, and x-intercepts <u>All.1</u> Factor polynomials completely</p> <p><u>Unit 6 – Radical Functions</u> <u>All.6</u> Radical function families (square root and cube root) <u>All.7</u> Graphs of radical functions & transformational graphing <u>All.7</u> Composite functions and inverse functions <u>All.7a</u> – Analyze the continuity of functions (2016) <u>All.7c</u> – Determine the extrema of a function (2016) <u>All.7f</u> – Determine values of a function for elements in its domain (2016) <u>All.7g</u> – Make connections between and among multiple representations of a function (2016)</p> <p>*Quarterly assessment will include quarter 2 content from: <u>All.1 bcd</u>, <u>All.3</u>, <u>All.4 bd</u>, <u>All.5</u>, <u>All.6</u>, <u>All.7a-h</u>, <u>All.8</u>, <u>All.9</u></p>
<p>24 blocks</p>		<p>21 blocks</p>	

3 rd Quarter	4 th Quarter
<p><u>Unit 1-Classroom Routines:</u> <u>All.1</u> Factor polynomials completely</p> <p><i>Review characteristics of functions.</i></p>	<p><u>Unit 1-Classroom Routines:</u> <i>Spiral review of previous topics</i></p>
<p><u>Unit 6 – Radical Functions (Continued)</u> <u>All.1</u> Simplify radical expressions <u>All.4</u> Solve radical equations graphically and algebraically <u>All.7</u> Composite functions and inverse functions</p> <p><u>Unit 7-Rational Functions</u> <u>All.10</u> Direct, joint, and inverse variation <u>All.6</u> Rational function families <u>All.7</u> Graphs of rational functions <u>All.7a</u> – Analyze the continuity of functions (2016) <u>All.7c</u> – Determine the extrema of a function (2016) <u>All.7f</u> – Determine values of a function for elements in its domain (2016) <u>All.7g</u> – Make connections between and among multiple representations of a function (2016) <u>All.4</u> Solve rational equations graphically and algebraically <u>All.1</u> Simplifying rational expressions</p> <p><u>Unit 8- Exponential functions and Logarithmic functions</u> <u>All.9</u> Curve of best fit (exponential and logarithmic) <u>All.6</u> Exponential and logarithmic function families <u>All.7</u> Graphs of exponential and logarithmic functions <u>All.7a</u> – Analyze the continuity of functions (2016) <u>All.7c</u> – Determine the extrema of a function (2016) <u>All.7f</u> – Determine values of a function for elements in its domain (2016) <u>All.7</u> Verify relationship between exponential functions and logarithmic functions graphically <u>All.7g</u> – Make connections between and among multiple representations of a function (2016)</p> <p>*Quarterly assessment will include quarter 3 content from: All.1a, All.2, All.4c, All.6, All.7a-h, All.9, All.10</p>	<p><u>Unit 9 – Sequences, Series, and Stats</u> <u>All.2</u> Arithmetic and geometric sequences and series <u>All.12</u> Permutations and Combinations <u>All.11</u> Normal Distribution</p> <p><u>Post SOL Topics</u></p> <ul style="list-style-type: none"> • Logarithmic properties • Condensing and expanding logarithms • Natural logarithms • Solving exponential and logarithmic equations algebraically • Composite rational functions • Solving quadratic inequalities algebraically • Completing the square leading to conics <p>Curriculum Completed by 4/6/18</p>
<p>21 blocks</p>	<p>23 blocks total</p>

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
<u>Unit 1 – Classroom Routines (Process Goals: Classroom Routines)</u>			
Entire Quarter	AII.3	<i>Expressions and Operations</i>	<ul style="list-style-type: none"> • <i>Number system and subsets of numbers (classifying numbers)</i> • <i>Algebraic properties</i>
	AII.1	<i>Expressions and Operations</i>	<ul style="list-style-type: none"> • <i>Simplifying expressions</i>
			<ul style="list-style-type: none"> • <i>Review algebraic expressions (using order of operations)</i>
			<ul style="list-style-type: none"> • <i>Review basic factoring from Algebra 1 (GCF, trinomials, difference of squares)</i>
<u>Unit 1A – Review Key Algebra Concepts</u>			
2	AII.3	<i>Expressions and Operations</i>	<ul style="list-style-type: none"> • <i>Number system and subsets of numbers (classifying numbers)</i> • <i>Algebraic properties</i>
	AII.1	<i>Expressions and Operations</i>	<ul style="list-style-type: none"> • <i>Simplifying expressions</i>
			<ul style="list-style-type: none"> • <i>Review algebraic expressions (using order of operations)</i>
			<ul style="list-style-type: none"> • <i>Review basic factoring from Algebra 1 (GCF, trinomials, difference of squares)</i>
<u>Unit 2 – Investigating Characteristics of Functions</u>			
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.			
7	AII.9	Functions and Statistics	<ul style="list-style-type: none"> • The student will analyze data <u>in graphical form</u> in order to make predictions and solve real world problems.
	AII.7a-g	Functions and Statistics	<ul style="list-style-type: none"> • 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 and Statistics	<ul style="list-style-type: none"> • <u>Using graphical representations</u>, investigate and describe the relationship between zeros, x-intercepts, and solutions to various functions.
<u>Unit 3 – Absolute Value</u>			
Students should investigate the characteristics of absolute value functions as a function family, graphically, and then explore solving absolute value equations and inequalities algebraically. Students should be using multiple representations to justify their work.			

Scope and Sequence – Quarter 1

7	AII.6	Functions and Statistics	<ul style="list-style-type: none"> 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 and Statistics	<ul style="list-style-type: none"> 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 and Statistics	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Solve absolute value equations and inequalities graphically first then algebraically. Express characteristics in both interval notation and set builder notation.

Unit 4 – Quadratics (continues into Quarter 2)

Students should investigate the characteristics of quadratic functions as a function family, graphically, and then explore solving quadratic equations algebraically. Students should use multiple representations to justify their work.

6	AII.6	Functions and Statistics	<ul style="list-style-type: none"> Investigate quadratic functions using graphical representations. Use transformational graphing to graph quadratic functions.
	AII.7	Functions and Statistics	<ul style="list-style-type: none"> 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.
	AII.8	Functions and Statistics	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Solve quadratic equations <u>graphically</u>. If time permits, include solving quadratic inequalities graphically and algebraically.
2*	<ul style="list-style-type: none"> Quarterly Assessments, Remediation, and Intervention 		

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

Scope and Sequence – Quarter 2

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
<u>Unit 1 – Classroom Routines</u>			
<i>Entire Quarter</i>	AII.1bc	<i>Expressions and Operations</i>	<ul style="list-style-type: none"> <i>Simplify radical expressions</i> <i>Review laws of exponents; operations with polynomial expressions</i>
	AII.1	<i>Expressions and Operations</i>	<ul style="list-style-type: none"> <i>Factor polynomials completely</i>
<u>Unit 4 – Quadratics (continued from Quarter 1)</u>			
10	AII.1d	Expressions and Operations	<ul style="list-style-type: none"> Factor quadratic expressions and equations completely (make connections to factoring in Algebra I)
	AII.7	Functions	<ul style="list-style-type: none"> Investigate and analyze quadratic functions using multiple representations. Make connections between the common forms of quadratic equations (standard, intercept, vertex forms)
	AII.4b	Equations and Inequalities	<ul style="list-style-type: none"> 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.
	AII.3	Equations and Inequalities	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Solve nonlinear systems graphically and algebraically. Include linear-quadratic system of two equations and quadratic-quadratic system of two equations.
	AII.9	Functions and Statistics	<ul style="list-style-type: none"> 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.

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.

7	AII.9	Functions and Statistics	<ul style="list-style-type: none"> Analyze real world data that can be modeled with higher order polynomial relations
	AII.6	Functions and Statistics	<ul style="list-style-type: none"> 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 and Statistics	<ul style="list-style-type: none"> 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. Explore why discontinuities do not occur in polynomial functions.
	AII.8	Functions and Statistics	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Factor polynomial expressions completely

Unit 6 – Radical Functions

Students should investigate the characteristics of radical functions as a function family, graphically, and then explore solving radical equations algebraically. Students should be using multiple representations to justify their work.

2	AII.6	Functions and Statistics	<ul style="list-style-type: none"> Investigate transformational graphing with radical functions
	AII.7a-f	Functions and Statistics	<ul style="list-style-type: none"> 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.
2*	<ul style="list-style-type: none"> Quarterly Assessments, Remediation, and Intervention 		

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

Scope and Sequence – Quarter 3

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
<u>Unit 1 – Classroom Routines</u>			
	AII.1d	Expressions and Operations	<ul style="list-style-type: none"> Factoring polynomial expressions completely
	AII.7	Functions and Statistics	<ul style="list-style-type: none"> Review characteristics of functions
<u>Unit 6 – Radical Functions</u>			
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.			
5	AII.1b, c	Expressions and Operations	<ul style="list-style-type: none"> Simplify radical expressions. Be sure to include the nth root, rationalizing denominator, and combining like terms
	AII.4d	Equations and Inequalities	<ul style="list-style-type: none"> Solve radical equations graphically and algebraically
	AII.7g, h	Functions and Statistics	<ul style="list-style-type: none"> 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.
<u>Unit 7 – Rational Functions</u>			
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.			
10	AII.10	Functions and Statistics	<ul style="list-style-type: none"> Direct, joint, and inverse variation and include real world situations.
	AII.6	Functions and Statistics	<ul style="list-style-type: none"> Investigate rational function families and transformational graphing
	AII.7a-f	Functions and Statistics	<ul style="list-style-type: none"> 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.
	AII.4c	Equations and Inequalities	<ul style="list-style-type: none"> Solve rational equations graphically and algebraically
	AII.1a	Expressions and Operations	<ul style="list-style-type: none"> Simplify and perform operations with rational algebraic expressions
<u>Unit 8 – Exponential Functions and Logarithmic functions</u>			
Students should investigate the characteristics of exponential functions and logarithmic functions as a function family, graphically. Students should be using multiple representations to justify their work. *Solving exponential and logarithmic functions algebraically			

Scope and Sequence – Quarter 3

is a post-SOL topic.			
4	AII.9	Functions and Statistics	<ul style="list-style-type: none"> Collect and analyze data modeling exponential and logarithmic functions and determine the curve of best fit
	AII.6	Functions and Statistics	<ul style="list-style-type: none"> Investigate exponential function families and logarithmic function families and transformational graphing
	AII.7a-f	Functions and Statistics	<ul style="list-style-type: none"> Investigate and analyze exponential functions and logarithmic 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.
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
<i>Unit 1 – Classroom Routines</i>			
<i>Entire Quarter</i>			<ul style="list-style-type: none"> <i>Spiral review of previous topics (SOL review)</i>
Unit 9 – Sequences, Series, and Stats			
Students should apply properties of sequences and series. Students should be using multiple representations to justify their work. Students should apply properties of normal distribution as well as distinguish between permutations and combinations.			
4	AII.2	Functions and Statistics	<ul style="list-style-type: none"> Investigate and apply properties of arithmetic and geometric sequences and series to solve real-world problems, including writing the first n terms, finding the n^{th} term, and evaluating summation formulas. Notation will include sigma notation and a_n.
	AII.11	Functions and Statistics	<ul style="list-style-type: none"> Identify properties of a normal distribution and apply those properties to determine probabilities associated with areas under the standard normal curve.
	AII.12	Functions and Statistics	<ul style="list-style-type: none"> Compute and distinguish between permutations and combinations and use technology for applications.
Unit 10 – SOL Review and Post SOL Topics			
15			<ul style="list-style-type: none"> Unit 9 Review and Assess if needed Logarithmic properties Condensing and expanding logarithms Natural logarithms Solving exponential and logarithmic equations algebraically Piece-wise Defined Functions Solving quadratic inequalities algebraically Completing the square leading to conics
4	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](#)

[VDOE 2016 Curriculum Framework](#)

(click link above)

Additional information about math vocabulary can be found in the

[VDOE Vocabulary Word Wall Cards](#)

(click link above)