Richmond Public Schools

Curriculum Framework

Algebra II

Strand: Equations and Inequalities
AII.3 The student will solve **a) absolute value linear equations and inequalities;** **b) quadratic equations over the set of complex numbers;** **c) equations containing rational algebraic expressions; and** **d) equations containing radical expressions.**
Suggested Pacing
A) 3 Class Periods B) 3 Class Periods C) 2 Class Periods D) 2 Class Periods
Spiraling Standards

8.17-The student will solve multistep linear equations in one variable with the variable on one or both sides of the equation, including practical problems that require the solution of a multistep linear equation in one variable. 8.18-The student will solve multi step linear inequalities in one variable with the variable on one or both sides of the inequality symbol, including practical problems, and graph the solution on a number line. A.2-The student will perform operations on polynomials, including a) applying the laws of exponents to perform operations on expressions; b) adding, subtracting, multiplying, and dividing polynomials; c) factoring completely first- and second-degree binomials and trinomials in one variable.	MA.7-The student will perform operations with vectors in the coordinate plane and solve practical problems using vectors. MA.9-The student will investigate and identify the characteristics of the graphs of polar equations.

A.3-The student will simplify a) square roots of whole numbers and monomial algebraic expressions; b) cube roots of integers; and c) numerical expressions containing square or cube roots. A.4-The student will solve a) multistep linear equations in one variable algebraically; b) quadratic equations in one variable algebraically; A.5-The student will a) solve multistep linear inequalities in one variable algebraically and represent the solution graphically; b) represent the solution of linear inequalities in two variables graphically; c) solve practical problems involving inequalities; and d) represent the solution to a system of inequalities graphically.	
Essential Questions	**Common Misconceptions**
What are the characteristics of an absolute value function? Why can an absolute value equation take on more than one solution? What are the methods used to solve quadratic equations? How is the discriminant of a quadratic equation calculated and what is its significance? How does a graphing calculator confirm algebraic solutions of quadratic equation? How is an equation containing rational expressions solved? How is an equation containing radical expressions solved? How is an absolute value equation solved? How can the solution for an absolute value inequality be described?	Students may not solve the absolute value equations and inequalities twice. Students may forget to change signs when solving when writing the second equation to be solved When solving rational equations, student may not simplify before trying to solve. Students may not perform operation properly to eliminate the radical before trying to solve. Students may not use the proper root in solving radical equations. Students may assume that function that do not intersect the x-axis has no solution Students may substitute values incorrectly into the quadratic formula

	Students will have difficulty converting radical expressions to expressions with rational exponents
Understanding the Standard	**Essential Knowledge and Skills**
• A quadratic function whose graph does not intersect the *x*-axis has roots with imaginary components. • The quadratic formula can be used to solve any quadratic equation. • The quadratic formula can be derived by applying the completion of squares to any quadratic equation in standard form. • The value of the discriminant of a quadratic equation can be used to describe the number and type of solutions. • Solutions of quadratic equations are real or a sum or difference of a real and imaginary component. • Complex solutions occur in conjugate pairs. • Quadratic equations with exactly one real root can be referred to as having one distinct root with a multiplicity of two. For instance, the quadratic equation, $x^2 - 4x + 4$, has two identical factors, giving one real root with a multiplicity of two. • The definition of absolute value (for any real numbers *a* and *b*, where $b \geq 0$, if $\|a\| = b$, then $a = b$ or $a = -b$) is used in solving absolute value equations and inequalities. • Absolute value inequalities in one variable can be solved algebraically using a compound statement.	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to** • Solve absolute value linear equations or inequalities in one variable algebraically. (a) • Represent solutions to absolute value linear inequalities in one variable graphically. (a) • Solve a quadratic equation over the set of complex numbers algebraically. (b) • Calculate the discriminant of a quadratic equation to determine the number and type of solutions. (b) • Solve rational equations with real solutions containing factorable algebraic expressions algebraically and graphically. Algebraic expressions should be limited to linear and quadratic expressions. (c) • Solve an equation containing no more than one radical expression algebraically and graphically. (d) • Solve equations and verify algebraic solutions using a graphing utility. (a, b, c, d)

- Compound statements representing solutions of an inequality in one variable can be represented graphically on a number line.
- Practical problems can be interpreted, represented, and solved using equations and inequalities.
- The process of solving equations can lead to extraneous solutions.
- An extraneous solution is a solution of the simplified form of an equation that does not satisfy the original equation.
- Equations can be solved in a variety of ways.
- The zeros, roots, or solutions of a function are the values of x that make $f(x) = 0$
- The real zeros of a function are the x-intercepts of that function.
- Radical expressions may be converted to expressions using rational exponents.
- The equation of an inverse variation is a rational function.
- Solutions and intervals may be expressed in different formats, including set notation, using equations and inequalities, or interval notation.
  - Examples may include:

Equation/Inequality	Set Notation	Interval Notati
$x = 3$	{3}	
$x = 3$ or $x = 5$	{3, 5}	
$0 \leq x < 3$	$\{x \mid 0 \leq x < 3\}$	[0, 3)
$y \geq 3$	$\{y: y \geq 3\}$	[3, ∞)
Empty (null) set ∅	{ }	

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Vocabulary	Instructional Activities Organized by Learning Objective
algebraically, graphically, absolute value, equation, inequality, quadratic, quadratic equation, quadratic formula, complex number, rational algebraic expression, rational algebraic equation, radical expression, radical equation, solution, zeros, roots, imaginary, real solution, complex solution, compound statement, discriminant, monomial, binomial, denominator, numerator, set notation, interval notation, completion of squares, standard form	**Textbook** Eureka Math Algebra 1 Module 3 Topic C, Lesson 15 Eureka Math Algebra 2 Module 1 Topic C Algebra 2, ©2012, Price, et al, McGraw-Hill page(s) 27-31, 43-47, 259 - 301, 453-461,594-595,600- 601,603-604 **Notes** Absolute Value (Purplemath) Absolute Value Inequalities (Monterey Institute) Solving Rational Equations (Purplemath) Solving Radical Equations (Purplemath) **Resources** ● **Print** Coach book, Virginia edition, lesson 9 & 10 of chapter 2, lesson 11 & 12 of chapter 2, lesson 13 & 14 of chapter 2 VDOE Lesson Plan AII.3a VDOE Lesson Plan AII.3b VDOE Lesson Plan AII.3c VDOE Lesson Plan AII.3d ● **Technology-based** Absolute Value (Khan Academy) Absolute Value Equations (Khan Academy) Point in the Complex Plane (Gizmos) Rational Expressions and Equations Review (Smartboard Exchange) Solving Radical Equations Question Set (Smartboard Exchange)
Assessment Common Assessment AII.3a Common Assessment AII.3b Common Assessment AII.3c Common Assessment AII.3d	

	Station Activities Algebra 2 Scramble Board
Cross-Curricular Connections	Tiered Differentiations
Science -Absolute value equations can be used or reference when working with temperature. Rational Expressions and Equations are used in problems with motion.	**Tier 1**-Students will solve multi step absolute value equations and inequalities. Students will be given multi step equations to solve in radical and rational form. Rational equations will require factoring GCF and factoring of the polynomial. Radical equations will involve simplifying constants and variables and roots will be higher than 3. **Tier 2**-Student will solve two step absolute value equations and inequalities. Students will be given rational equations that involve factoring using GCF for monomials or trinomials. Radical equations will contain non perfect cubes or squares with more than two variables. **Tier 3**-Students will start with one step absolute value equations and inequalities. Students will be given rational equations that are already factoring or require simple factoring. Radical equations will involve perfect squares or cubes with no more than two variables