

**Richmond Public Schools**  
Curriculum Framework  
*Algebra II*

Strand: Expressions and Operations	
<p><b>All.1 The student will</b></p> <ul style="list-style-type: none"> <li>a) add, subtract, multiply, divide, and simplify rational algebraic expressions;</li> <li>b) add, subtract, multiply, divide, and simplify radical expressions containing rational numbers and variables, and expressions containing rational exponents; and</li> <li>c) factor polynomials completely in one or two variables.</li> </ul>	
Suggested Pacing	
<ul style="list-style-type: none"> <li>A) 3 Class Periods</li> <li>B) 3 Class Periods</li> <li>C) 3 Class Periods</li> </ul>	
Spiraling Standards	
<p>8.3-The student will</p> <ul style="list-style-type: none"> <li>a) estimate and determine the two consecutive integers between which a square root lies; and</li> <li>b) determine both the positive and negative square roots of a given perfect square.</li> </ul> <p>8.14-The student will</p> <ul style="list-style-type: none"> <li>a) evaluate an algebraic expression for given replacement values of the variables; and</li> <li>b) simplify algebraic expressions in one variable.</li> </ul> <p>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.</p> <p>A.2-The student will perform operations on polynomials, including</p>	<p>MA.12-The student will expand binomials having positive integral exponents.</p>

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<p>a) applying the laws of exponents to perform operations on expressions;</p> <p>b) adding, subtracting, multiplying, and dividing polynomials;</p> <p>c) factoring completely first- and second-degree binomials and trinomials in one variable.</p> <p>A.3-The student will simplify</p> <p>a) square roots of whole numbers and monomial algebraic expressions;</p> <p>b) cube roots of integers; and</p> <p>c) numerical expressions containing square or cube roots.</p>	
<b>Essential Questions</b>	<b>Common Misconceptions</b>
<ul style="list-style-type: none"> <li>● What is a rational expression?</li> <li>● How is a rational expression simplified?</li> <li>● What is a radical expression?</li> <li>● How are radical expressions simplified?</li> <li>● How do radical expressions apply to real-life situations?</li> <li>● How is conversion between radical and rational exponents completed?</li> <li>● When is a polynomial completely factored?</li> <li>● What are the patterns to investigate when factoring a polynomial?</li> </ul>	<ul style="list-style-type: none"> <li>● Students may not factor the polynomial correctly.</li> <li>● Students may use the wrong sign in the factors of polynomials or the wrong coefficients.</li> <li>● Students may perform the wrong operations in factoring and simplifying rational expressions.</li> <li>● Students may not recognize which techniques to use in simplifying rational expression.</li> <li>● Students may not eliminate the proper terms or factors.</li> <li>● Students may use techniques for multiplying and dividing rational expressions when they need to add or subtract them.</li> <li>● Students may not identify the proper gcd or common denominator.</li> <li>● Students may not factor the polynomial correctly.</li> <li>● Students may use the wrong sign in the factors of polynomials or the wrong coefficients.</li> <li>● Students may identify the difference of squares and difference of cubes incorrectly.</li> <li>● Students may miss steps in performing synthetic division.</li> </ul>
<b>Understanding the Standard</b>	<b>Essential Knowledge and Skills</b>

# Richmond Public Schools

## Curriculum Framework

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<ul style="list-style-type: none"> <li>• Computational skills applicable to numerical fractions also apply to rational expressions involving variables.</li> <li>• Radical expressions can be written and simplified using rational exponents.</li> <li>• Only radicals with a common radicand and index can be added or subtracted, which may require rewriting a radical with a lower base and different index.</li> <li>• A relationship exists among arithmetic complex fractions, algebraic complex fractions, and rational numbers.</li> <li>• The complete factorization of polynomials has occurred when each factor is a prime polynomial.</li> <li>• Pattern recognition can be used to determine complete factorization of a polynomial.</li> <li>• Polynomials may be factored in various ways, including, but not limited to grouping or applying general patterns such as difference of squares, sum and difference of cubes, and perfect square trinomials.</li> </ul>	<p><b>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to</b></p> <ul style="list-style-type: none"> <li>• Add, subtract, multiply, and divide rational algebraic expressions. (a)</li> <li>• Simplify a rational algebraic expression with monomial or binomial factors. Algebraic expressions should be limited to linear and quadratic expressions. (a)</li> <li>• Recognize a complex algebraic fraction, and simplify it as a quotient or product of simple algebraic fractions. (a)</li> <li>• Simplify radical expressions containing positive rational numbers and variables. (b)</li> <li>• Convert between radical expressions and expressions containing rational exponents. (b)</li> <li>• Add and subtract radical expressions. (b)</li> <li>• Multiply and divide radical expressions. Simplification may include rationalizing denominators. (b)</li> <li>• Factor polynomials in one or two variables with no more than four terms completely over the set of integers. Factors of the polynomial should be constant, linear, or quadratic. (c)</li> <li>• Verify polynomial identities including the difference of squares, sum and difference of cubes, and perfect square trinomials. (c)</li> </ul>
<b>Vocabulary</b>	<b>Instructional Activities Organized by Learning Objective</b>
simplify, rational, expression, exponents, radical, polynomial, radicand, variable, factor, GCF (greatest common factor), inverse,	<b>Textbook</b>

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reciprocal, numerator, denominator, index, arithmetic complex fraction, algebraic complex fraction, rational numbers, prime, prime polynomial, monomial, binomial, sum of squares, difference of squares, sum of cubes, difference of cubes, perfect square, perfect square trinomials, integers

**Assessment**

[Common Assessment AII.1a](#)  
[Common Assessment AII.1b](#)  
[Common Assessment AII.1c](#)

[Eureka Math Algebra 2 Module 1 Topics B and C](#)

Algebra 2, ©2012, Price, et al, McGraw-Hill page(s) 269 - 274, 439 - 441, 553 - 554

**Notes**

[Factoring Notes \(Tutorial Math\)](#)

[Simplifying Rational Expression \(Math Warehouse\)](#)

[Adding and Subtracting Radicals \(Math Portal\)](#)

**Resources**

• **Print**

Coach book, Virginia edition, lesson 2 of chapter 1, lesson 13 of chapter 2, lesson 14 of chapter 2

[VDOE Lesson Plan AII.1a](#)

[VDOE Lesson Plan AII.1b](#)

[VDOE Lesson Plan AII.1c](#)

• **Technology-based**

[Simplifying Rational Expressions \(Khan Academy\)](#)

[Simplifying Radical Expressions \(Khan Academy\)](#)

[Factoring Polynomials \(Gizmos\)](#)

[Simplifying Radical Expressions \(Gizmos\)](#)

[Operations with Radical Expressions \(Gizmos\)](#)

**Station Activities**

[Algebra 2 Scramble Board](#)

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Cross-Curricular Connections	Tiered Differentiations
<p><b>Science-</b> Factoring Polynomials can be useful in Physics and Chemistry. Factoring can be used to simplify lengthy formulas and equations presented in polynomial form. Rational Expressions and Equations are used in problems with motion.</p> <p><b>History-</b> Depending on the History being taught. Students can explore the use of factoring polynomials in ancient civilizations (Babylonian Mathematics)</p>	<p><b>Tier 1-</b> Students will be given multi step expressions to solve in radical and rational form. Rational expressions will require factoring GCF and factoring of the polynomial. Radical expressions will involve simplifying constants and variables and roots will be higher than 3.</p> <p><b>Tier 2-</b> Students will be given rational expressions that involve factoring using GCF for monomials or trinomials. Radical expressions will contain non perfect cubes or squares and more than two variables.</p> <p><b>Tier 3-</b> Students will be given rational expressions that are already factoring or require simple factoring. Radical expressions will involve perfect squares or cubes and no more than two variables</p>