WAKE COUNTY
PUBLIC SCHOOL SYSTEM

Math III UNIT 4 OVERVIEW: *Modeling with Expressions and Equations*

Unit Outcomes At the end of this unit, your student should be able to:	Key Vocabulary Terms to deepen the student's understanding

✓ Factor polynomials and use factoring to simplify rational expressions. (A-APR.6, A-APR.7)
✓ Factor by grouping, factor perfect cubes, and factor higher order sums and differences. (A-APR.6, A-APR.7)
✓ Rewrite rational expressions in different forms. (A-APR.6, A-APR.7)
✓ Write $\frac{a(x)}{b(x)}$ in the form $q(x) + \frac{r(x)}{b(x)}$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials and the degree of $r(x)$ is less than the degree of $b(x)$. (A-APR.6, A-APR.7, A-APR.2)
✓ Find the quotient of two polynomials by: (A-APR.6, A-APR.7)
   o inspection.
   o using long division.
   o using synthetic division.
   o using a computer algebra system.
✓ Add, subtract, multiply, and divide rational expressions. (A-APR.7)
✓ Calculate partial fractions from rational expressions.
✓ Create and solve rational equations in one-variable and use them to solve problems. (A-CED.1, A-REI.2)
✓ Solve rational equations approximately by graphing the corresponding functions using technology and estimating solutions, making tables of values, or finding successive approximations. (A-REI.11)
✓ Solve rational and radical equations algebraically and give examples of how extraneous solutions may arise.
Note: Topics highlighted in red are covered in Honors Math III only.
	✓ Rational Expression
	✓ Degree
	✓ Quotient
	✓ Remainder
	✓ Long Division
	✓ Synthetic Division
	✓ Computer Algebra System (CAS)
	✓ Partial Fractions
	✓ Rational Equation
	✓ Radical Equation
	✓ Extraneous Solution

Key Standards Addressed Connections to Common Core/NC Essential Standards	Where This Unit Fits Connections to prior and future learning
Note: Many standards appear in multiple units and courses. The concepts in bold are the focus for this unit. Notes in italics provide clarification for some standards.	Coming into this unit, students should have a strong foundation in: ✓ Factoring polynomials ✓ Operations with rational numbers ✓ Operations with polynomials
A-APR.6 Rewrite simple rational expressions in different forms; write	

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$a(x)/b(x)$ 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-APR.7 (+) 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.

Note: *Limit to rational expressions with constant, linear, and factorable quadratic terms.*

A-CED.1 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-REI.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

A-REI.11 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.

✓ Creating simple rational equations in one variable and using them to solve problems
✓ The concept of radicals (particularly square roots and cube roots)
✓ Solving equations by graphing related functions using technology

This unit builds to the following future skills and concepts:
Pre-Calculus
2.01 Use functions (polynomial, power, rational, exponential, logarithmic, logistic, piecewise-defined & greatest integer to model and solve problems; justify results.
2.03 For sets of data, create and use calculator-generated models of linear, polynomial, exponential, trigonometric, power, logistic, and logarithmic functions.
2.08 Explore the limit of a function graphically, numerically, and algebraically.

Additional Resources
Materials to support understanding and enrichment

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- ✓ Factoring by Grouping
- ✓ Factoring Cubes
- ✓ Reducing Common Factors to Simplify Rational Expressions
- ✓ Operations with Rational Expressions
- ✓ Multiplying and Dividing Rational Expressions
- ✓ Adding and Subtracting Rational Expressions
- ✓ Synthetic Division (Honors Only)
- ✓ Long Division of Polynomials
- ✓ Long Division (video)
- ✓ Solving Rational Equations by Multiplying by the LCD
- ✓ Solving Rational Equations
- ✓ Solving a Rational Equation with a Binomial in the Denominator
- ✓ Rational Equation with No Solution
- ✓ Extraneous (Excluded) Values
- ✓ Rational Equation with Extraneous Solution
- ✓ Solving Rational Equations using the Graphing Calculator
- ✓ Solving Radical Equations
- ✓ Solving a Radical Equation with a Binomial Radicand
- ✓ Extraneous Solutions with Radical Equations

* Please note, the unit guides are a work in progress. If you have feedback or suggestions on improvement, please feel free to contact sdupree@wcpss.net.