Unit 6: Radical Expressions and Rational Exponents
Algebra II
11 Class Meetings – Revised June 2016

Essential Questions

- How can radicals be simplified and combined?
- How can a radical equation be solved?
- How can real number operations be extended to radical expression and equations?

Enduring Understandings with Unit Goals

EU #1: Corresponding to every power there is a root. If the power of the radicand is greater than the index, the expression can be simplified.
- Evaluate radical expressions.

EU #2: All radicals can be multiplied and divided when either the radicand is the same *or* the index is the same. Only radicals with a common radicand *and* index can be added or subtracted.
- Apply real number operations to combine radicals.

EU #3: Radical expressions are the opposite of exponents; radical expressions can be written and simplified in an equivalent form using rational exponents.
- Convert between radical expressions and radical exponents and simplify.

EU #4: Radical equations can be solved by isolating the radical and squaring both sides of the equation. This process may introduce extraneous solutions.
- Solve radical equations.

Standards

Common Core State Standards/College and Career Readiness Anchor Standards :

- **CCSS.Math.Content.HSN.RN.A.2** – Rewrite expressions involving radicals and rational exponents using the properties of exponents.
- **CCSS.Math.Content.HSA.REI.A.2** – Solve simple radical equations in one variable, and give examples showing how extraneous solutions may arise.

MSMHS 21ˢᵗ Century Learning Expectations

Competency 1: Read and write effectively for a variety of purposes.
Competency 3: Make decisions and solve problems independently and collaboratively.
Competency 5: Contribute to a positive learning environment with respect and responsibility.

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Unit Content Overview

1. Basic Properties of Exponents

2. Roots and Radical Expressions
- Finding real roots
- Simplifying radical expressions

3. Multiplying and Dividing Radical Expressions
- Multiplying and simplifying radical expressions
- Dividing radical expressions
- Rationalizing the denominator

4. Binomial Radical Expressions
- Adding and subtracting radical expressions
- Simplifying before adding and subtracting
- Multiplying binomial radical expressions
- Multiplying conjugates
- Rationalizing the denominator (binomial)

5. Rational Exponents
- Simplifying expressions with rational exponents
- Converting between exponential and radical forms
- Simplifying and combining numbers with rational exponents
- Writing expressions in simplest forms

6. Solving Radical Equations
- Solving square root equations
- Solving other radical equations (use the inverse of the power)
- Checking for extraneous solutions
- Solving an equation with two radicals

Learning Objectives

Students will be able to…
- Compute the nth root of a radical expression.
- Explain how to multiply and divide radical expressions.
- Explain how to add and subtract radical expressions.
- Simplify expressions with rational exponents.
- Apply the properties of equality and exponents to solve square root and other radical equations.
- Explain how to eliminate extraneous solutions.
- Create and solve radical equations.

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Assured Learning Experiences

Differentiated Instruction/Instructional Strategies
- Lecture with notes
- Guided notes
- Accountable talk
- Student-led instruction
- Flipped classroom videos
- Student notes
- Independent problem-solving
- Collaborative problem-solving
- Who Wins the Race Performance Task
  - Rubric 3: Problem Solving
- Cross-curricular problem solving (independent and collaborative)
- Homework

Interdisciplinary Connections
- Language Arts - Word problems
- Marine Science – Word problems

Assessments

FORMATIVE ASSESSMENTS:

- Warm ups (SAT)
- ABCD Cards
- Whiteboards
- Mid-class check-ins
- Exit Slips
- Student-led instruction
- Homework
- Rubric 5: Civic and Social Responsibility
- Who Wins the Race Performance Task
  - Rubric 3: Problem Solving

SUMMATIVE ASSESSMENTS:

- Quiz 1 - Simplifying Radical Expressions – EU #1
- Quiz 2 - Multiplying/Dividing and Adding/Subtracting – EU #2
- Quiz 3 - Using Rational Exponents – EU #3
- Quiz 4 - Solving Square Root Equations – EU #4
- Unit 6 Test
- Who Wins the Race Performance Task

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Unit Task
Unit Task Name: Who Wins the Race? **Description:** Students will use information learned in this unit about how corresponding to every power there is a root (EU #1), how all radicals can be multiplied, divided, added, and subtracted under certain conditions (EU #2), how radical expressions are the opposite of exponents and can be rewritten (EU #3), and how radical equations can be solved by isolating the radical and squaring both sides of the equation (EU #4) in order to write and create an equation that will help to answer questions about a particular race. The goal of this task is to solve an equation involving a radical and then verify whether the solutions of the resulting quadratic equation are relevant. Students will need to use their knowledge of radicals to simplify and solve the equation to decide which person will win the race and at what time the girls are side by side. They will present their findings in a well-developed paragraph, showing all their calculations, with a picture if they choose. **Evaluation**: Rubric 3: Problem Solving

Unit Resources
- Textbook   - MSMHS School-wide Rubrics   - Flipped Classroom Videos   - Worksheets   - Graphing Calculator   - Laptops   - SAT Prep Online