Rational Expressions and Equations

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 31**
Length: **6 Weeks**
Status: **Published**

Unit Overview

In this unit, students divide polynomials by monomials and binomials; these will include problems with and without remainders. Students will simplify rational expressions and state any excluded values. They will also simplify complex fractions. Students will add, subtract, multiply, and divide rational expressions and then use these operations to solve rational equations.

Standards

CCSS.Math.Content.HSA-SSE.A.1.b	Interpret complicated expressions by viewing one or more of their parts as a single entity.
CCSS.Math.Content.HSA-SSE.B.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
CCSS.Math.Content.HSA-APR.A.1	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
CCSS.Math.Content.HSA-APR.B.2	Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$.
CCSS.Math.Content.HSA-APR.D.6	Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ 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.
CCSS.Math.Content.HSA-APR.D.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.
CCSS.Math.Content.HSA-REI.A.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

Essential Questions

1. How can previous mathematical strategies be applied in solving more complex problems?
2. How and when can rational functions be used?

Application of Knowledge and Skills...

Students will know that...

- 1. long division must be used when dividing a polynomial by a binomial
- 2. answers to long division problems may have remainders
- 3. a rational expression can be written as a ratio of two polynomials where the denominator is not zero
- 4. an excluded value is a number that makes a rational expression undefined
- 5. a complex fraction is a fraction that contains a fraction in the numerator, denominator, or both
- 6. a rational equation contains one or more rational expressions

Students will be skilled at...

Students will be able to:

- a. divide polynomials by monomials and binomials
- b. simplify rational expressions
- c. add, subtract, multiply, and divide rational expressions
- d. simplify complex fractions
- e. solve rational equations

Assessments

- Communicator Practice Diagnostic: Other written assessments Students will solve practice problems on communicators to receive immediate feedback
- Complex Fractions/Rational Expressions Quiz Formative: Written Test Students will take a quiz on simplifying complex fractions and adding and subtracting rational expressions
- Daily Warm-Up Problems Diagnostic: Other written assessments Students will complete daily warm-up problems to assess readiness
- Simplify Rational Expressions Quiz Formative: Written Test Students will take a quiz on polynomial long division, simplifying, multiplying, and dividing rational expressions
- Ticket to Leave Problems Formative: Other written assessments Students will complete one or two problems to assess knowledge and skills learning during the class period
- Unit Test Summative: Written Test Students will take a test on all topics covered in the unit

Activities

Dividing Polynomials Using Algebra Tiles Activity

Exploring Complex Fractions Investigation

Solving Linear Equations Using Fractions Investigation

Chapter Review Game/Activity

Challenge Problems: Swimming Pool Application and Medical Expertise Problems

Enrichment Project: How Far Can You See?

Students will derive a rational function that models the near point of the eye.

Polynomial Long Division

Activities to Differentiate Instruction

Mixed-ability grouping

Interactive Smart Board activities

Multi-Step Problem Solving

Math stations

Cooperative learning

Study guides (teacher and student completed)

Modify tests and homework as needed

Modified grading rubrics

Graphic organizers

Communicator response boards

Extended response questions

Challenge and enrichment homework assignments, worksheets, and enrichment project

Optional weekly challenge problems

Integrated/Cross-Disciplinary Instruction

Resources

McDougal Littell Algebra 1 textbook and resource materials

Website: www.classzone.com (see link)

Kuta Software

Algebra with Pizzazz

Punchline Algebra

Smart Exchange Website (see link)

- www.classzone.com
- http://exchange.smarttech.com/#tab=0