Unit 8: 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

MA.A-SSE.A.1b	Interpret complicated expressions by viewing one or more of their parts as a single entity.
MA.A-SSE.B.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
MA.A-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.
MA.A-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 $p(x)$.
MA.A-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.
MA.A-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 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

21st Century Skills

CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
CRP.K-12.CRP12.1	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.