

Unit 11 - Rational Expressions and Functions

Content Area: **Mathematics**
Course(s): **Algebra I**
Time Period: **May**
Length: **16 days**
Status: **Published**

Unit Overview

This unit connects and extends Big Ideas introduced in previous units to rational expressions and functions.

This unit will answer questions: How are rational expressions represented? What are the characteristics of rational functions? How can you solve a rational equation?

Enduring Understandings

- Rational expressions and polynomials can be added, subtracted, multiplied and divided using the same properties used to multiply and divide numerical fractions.
- The simplest form of a rational expression is like the simplest form of a numerical fraction. The numerator and denominator have no common factor other than 1. To simplify a rational expression, divide out common factors from the numerator and denominator.

Essential Questions

- How are rational expressions represented?
- How can you solve a rational equation?
- What are the characteristics of rational functions?

Standards/Indicators

MA.F-IF.B.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
MA.F-IF.B.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
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-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.
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
MA.A-CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Student Learning Objectives (SLOs)

- Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, simple rational and exponential functions and highlighting a quantity of interest in a formula.
- Create linear and quadratic equations that represent a relationship between two or more variables. Graph equations on the coordinate axes with labels and scale.

Lesson Titles

- Adding and Subtracting Rational Expressions
- Dividing Polynomials
- Multiplying and Dividing Rational Expressions
- Simplifying Rational Expressions
- Solving Rational Equations

Career Readiness, Life Literacies & Key Skills

TECH.9.4.2.CI.1	Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
TECH.9.4.2.CI.2	Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
TECH.9.4.2.CT.2	Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
TECH.9.4.2.DC.1	Explain differences between ownership and sharing of information.
TECH.9.4.2.DC.2	Explain the importance of respecting digital content of others.
TECH.9.4.2.DC.3	Explain how to be safe online and follow safe practices when using the internet (e.g., 8.1.2.NI.3, 8.1.2.NI.4).
TECH.9.4.2.TL.2	Create a document using a word processing application.
TECH.9.4.2.TL.3	Enter information into a spreadsheet and sort the information.

Inter-Disciplinary Connections

LA.RL.11-12.4	Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful. (e.g., Shakespeare as well as other authors.)
LA.RST.9-10.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
LA.W.9-10.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

LA.W.9-10.2.A	Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
LA.WHST.9-10.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LA.W.9-10.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
9-12.HS-ETS1-4.5	Using Mathematics and Computational Thinking

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK

- students will work as a team and explain their work
- #1- Blooms Knowledge - Remember previously learned information
- #2 - Blooms Comprehension - Demonstrate an understanding of facts
- #3 - Blooms Application - Apply Knowledge to actual situations
- #4 - Blooms Analysis - Break down objects or ideas into simpler parts and find evidence to support generalizations
- #5 - Blooms Synthesis - Compile component ideas into a new whole or propose alternative solutions
- #6 - Blooms Evaluation - Make and defend judgments based on internal evidence or external criteria
- review homework if need - answers posted on Edmodo
- review warm up
- students will work individually
- tutoring during Delsea One

Modifications

ELL Modifications

- Acquire the help from the Foreign Language Department if possible
- Assess ELL students continuously using formative assessment methods
- Be flexible with time frames and deadlines
- During Delsea One - one on one with a student who speaks the same language
- Intentional scheduling/grouping with student/teacher who speaks the same language if possible
- Khan Academy offers lesson in several languages: <https://es.khanacademy.org/>
- Offer resources for specific topics in primary language (Youtube web resources)
- Repeat, reword, clarify

- The NEA Portal offers lessons in several languages: <http://neaportal.k12.ar.us/index.php/algebra-1-en-espanol/>
- tutoring during Delsea One
- Use google translator, especially for application problems

IEP & 504 Modifications

- Allow re-takes only after a tutoring session
- if not in a co-teaching setting allowing time in the schedule for a special education teacher to consult with general education teachers on what specifically can be modified or how to paraphrase things in a different way specific to that lesson
- Keep updated videos on google classroom for reinforcement outside of the classroom
- Less questions overall or possibly break the test into two parts
- Modeling and showing several examples
- speaking to students privately when redirecting behaviors
- tutoring during Delsea One
- Upload several youtubes on the concepts that are in this specific unit

G&T Modifications

- Ask students' higher level questions that require students to look into causes, experiences, and facts to draw a conclusion or make connections to other areas of learning
- Employ differentiated curriculum to keep interest high
- Encourage students to make transformations- use a common task or item in a different way
- Flip the lessons to push further ahead
- Flip the lessons using videos of more in depth work
- Provide more rigorous problems; either off the NJ State website or from the Pearson Algebra 2 textbook (available on mathxl)
- tutoring during Delsea One
- Videos that offer extra practice and examples in all areas are posted on google classroom and taken from: mathispower4u

At Risk Modifications

- Refer students to Organizational Management
- Require Delsea One tutoring
- Stay in contact with parents/guardians and guidance counselors on student progress
- tutoring during Delsea One

Benchmark Assessment

Alternate Assessment

Performance tasks

Project-based assignments

Problem-based assignments

Presentations

Formative Assessment

- connecting previous lessons
- Discussion including vocab review/recall
- evaluate your understanding of the lesson
- Guided review
- Mathxlforschool
- NJSLA Math type of question
- pass out of class
- SAT question of the day
- Skill need for the lesson
- teacher observation
- turn to your partner and discuss
- warm up review
- White board paddles

Summative Assessment

- Quiz on Simplifying Rational Expressions

Resources & Material

- Colored pencils/highlighters
- Google Slides

- Mathispower4u video clip to introduce or demonstrate concepts
- Pearson 2015 Algebra 1 Textbook
- Teacher generated worksheets
- White board paddles

Technology

- Chromebooks
- Desmos
- Edpuzzle
- Equatio
- Google Classroom
- Google Forms
- Graphing Calculator
- Mathway
- Mathxlforschool
- PearDeck
- Remind
- Video Clips

TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.12.A.4	Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.