Unit 1: Equations and Inequalities

Content Area: **Mathematics**
Course(s): **Pre Algebra**
Time Period: **Generic Time Period**
Length: **13 weeks**
Status: **Published**

Unit Overview

During this unit, students will solve multi-step rational equations and solve multi-step rational inequalities and graph the solution on a number line.

Throughout this unit, students will continue to improve their fluency with basic mathematical concepts through the use of Exact Path instructional software. This software is designed to identify students' strengths and weaknesses and generate programs of review, remediation, and growth through hundreds of interactive lessons/practice. Lessons are engaging, individualized, and self-paced, and instructive feedback is provided to students and their teacher. The teacher will monitor student learning and assist students as they continue to work with Exact Path software throughout the unit.

By the end of January, administer the Link It G8 NJSLS online Form B.

Transfer

Students will be able to independently use their learning to...

- Write and solve equations and inequalities that will help them answer real-world questions.

For more information, read the following article by Grant Wiggins.

http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60

Meaning

Understandings

Students will understand that...

- using the Algebraic Properties assist in simplifying expressions.
- solving a rational equation or inequality has validity in the order of how it is solved.
- graphing the inequality is representing the solutions of the variable/real life situation.

- Equations and inequalities can be used to model real-world situations.

Essential Questions

Students will keep considering...

- How would you use the distributive property to write an equivalent variable expression?
- How do you simplify an expression that has several terms?
- What is an equation?
- What should be your first step when solving an equation?
- How do you solve an equation/inequality with the variables on both sides?
- What is an example of an inequality that can solved using the addition or subtraction property of inequality?
- When does the inequality symbol need to be reversed when solving an inequality?
- How is solving an equation with terms that are fractions different from solving an equation whose terms only involve integers?

Application of Knowledge and Skill

Students will know...

- how to identify like terms
- vocabulary terms to identify operations (add, subtract, multiply, divide, equals, is less than, etc)
- steps needed to solve equations and inequalities
- symbols for inequalities and how to plot on number line
- fraction rules for all operations

Students will be skilled at...
- selecting the best property to use in specific situations

- distributive property and simplify like terms
- writing equations from verbal sentences
- solving rational equations and inequalities
- graphing the solution to an inequality
- using the appropriate symbol when graphing inequalities

Academic Vocabulary

additive identity, multiplicative identity, commutative property, associative property, addition property of equality, subtraction property of equality, multiplication property of equality, division property of equality, symmetric property of equality

equivalent numerical expressions, equivalent variable expressions, distributive property

term, coefficient, constant terms, like terms

equation, solution of an equation, solving an equation

verbal model, inverse operations

inequality, solution of an inequality, equivalent inequalities

Learning Goal 1

Students will be able to interpret complicated expressions by viewing one or more of their parts as a single entity.

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.	
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.	
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.	
CRP.K-12.CRP11	Use technology to enhance productivity.	
TECH.8.1.12.A.CS1	Understand and use technology systems.	
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.	
TECH.8.1.12.E.CS1	Plan strategies to guide inquiry.	
TECH.8.1.12.E.CS4	Process data and report results.	
TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.	
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.	
TECH.8.2.12.A.CS2	The core concepts of technology.	

Target 1--(Level of Difficulty - 1: Retrieval)

SWBAT compute numerical expressions using the order of operations

MA.K-12.7	Look for and make use of structure.
MA.7.EE.A	Use properties of operations to generate equivalent expressions.

Target 2--(Level of Difficulty - 2: Comprehension)

SWBAT explain ways in which to simplify expressions

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.7	Look for and make use of structure.
MA.7.EE.A	Use properties of operations to generate equivalent expressions.
MA.7.EE.A.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

Learning Goal 2

Students will be able to solve rational multi-step equations

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP11	Use technology to enhance productivity.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.E.CS1	Plan strategies to guide inquiry.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.
TECH.8.2.12.A.CS2	The core concepts of technology.

Target 1--(Level of Difficulty - 3: Analysis)

SWBAT create an equation using mathematical vocabulary.

Include real-world problems that include 2 moms/dads

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.A-SSE.A.1a	Interpret parts of an expression, such as terms, factors, and coefficients.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.

MA.A-SSE.A.1b	Interpret complicated expressions by viewing one or more of their parts as a single entity.
MA.K-12.4	Model with mathematics.
MA.A-SSE.A.2	Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.
MA.K-12.6	Attend to precision.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.

Target 2--(Level of Difficulty - 3: Analysis)

SWBAT solve rational equations with variable on one side.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.A-SSE.A.1a	Interpret parts of an expression, such as terms, factors, and coefficients.
MA.A-SSE.A.1b	Interpret complicated expressions by viewing one or more of their parts as a single entity.
MA.A-SSE.A.2	Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.
MA.K-12.7	Look for and make use of structure.
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-REI.A.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
MA.A-REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Target 3--(Level of Difficulty - 3: Analysis)

SWBAT create and solve multi-step rational equations with variables on both sides

MA.K-12.2	Reason abstractly and quantitatively.
MA.A-SSE.A.1a	Interpret parts of an expression, such as terms, factors, and coefficients.
MA.A-SSE.A.1b	Interpret complicated expressions by viewing one or more of their parts as a single entity.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.A-SSE.A.2	Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.
MA.K-12.5	Use appropriate tools strategically.
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
MA.6.NS.C.7b	Write, interpret, and explain statements of order for rational numbers in real-world

contexts.

| MA.A-REI.A.1 | Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. |
| MA.A-REI.B.3 | Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. |

Learning Goal 3

Students will solve and graph rational inequalities

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP11	Use technology to enhance productivity.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.E.CS1	Plan strategies to guide inquiry.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.
TECH.8.2.12.A.CS2	The core concepts of technology.

Target 1--(Level of Difficulty - 3: Analysis)

SWBAT solve and graph one step inequalities

MA.K-12.2	Reason abstractly and quantitatively.
MA.A-SSE.A.1a	Interpret parts of an expression, such as terms, factors, and coefficients.
MA.A-SSE.A.1b	Interpret complicated expressions by viewing one or more of their parts as a single entity.
MA.A-SSE.A.2	Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
MA.A-REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Target 2--(Level of Difficulty - 3: Analysis)

SWBAT solve and graph multi-step rational inequalities

Include word problems where a lesbian/gay couple are comparing companies to use for home repair/cell phone.

MA.A-SSE.A.1a	Interpret parts of an expression, such as terms, factors, and coefficients.
MA.A-SSE.A.1b	Interpret complicated expressions by viewing one or more of their parts as a single entity.
MA.K-12.4	Model with mathematics.
MA.A-SSE.A.2	Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
MA.A-REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Formative Assessment and Performance Opportunities

- Corrections
- Do Nows - spiraling content
- Exit Tickets
- Extra time
- Guided Practice
- Homework
- Learning Games
- Learning Stations
- Questioning
- Self-Assessed Scale Rating
- Whiteboard/Communicator Opportunities

Summative Assessment

- Class assessments
- Common assessments (Unit Exams)
- Exact Path
- LinkIt
- Set Activities
- Station Activities

21st Century Life and Careers and Technology

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CAEP.9.2.12.C.2	Modify Personalized Student Learning Plans to support declared career goals.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.2.12.A.CS3	The relationships among technologies and the connections between technology and other fields of study.
TECH.8.2.12.D.6	Synthesize data, analyze trends and draw conclusions regarding the effect of a technology on the individual, society, or the environment and publish conclusions.

Accomodations and Modifications

- 504 Accommodations
- Exact Path
- Guided notes
- IEP Modifications
- Learning Centers/Stations
- Manipulatives
- Projects
- Scaffolding Questions
- Small Group Instruction
- Technology

Unit Resources

- Albert
- Exact Path
- Khan Academy
- Kuta Software
- Quizzizz
- Textbook Resource Kit
- Textbook: Pre-Algebra (Holt McDougal, 2012)

Interdisciplinary Connections/Cross Curricular Connections

Real world applications involving budgeting for a business or family (MA.9-12.A-CED.A.1)

PFL.9.1.12.D.12   Compare and contrast the past and present role of government in the financial industry and in the regulation of financial markets.