

Unit 2: Solving Equations and Inequalities

Algebra Prep Honors

18 meetings

Revised May 2024

Essential Questions

- How can number properties help solve real-world equations?
- When do algebraic equations solve mathematical situations?
- How can inequalities be used to represent relationships and solve problems?

Enduring Understandings with Unit Goals

EU 1: Properties of real numbers, properties of equality, graphing, and inverse operations can be used to obtain a solution to an equation or linear inequality and model real-world situations.

- Apply the distributive property to evaluate expressions
- Evaluate and simplify expressions by combining like terms
- Utilize inverse operations to solve one- and two-step equations and inequalities
- Understand that multiplying or dividing by a negative number changes the symbol of the inequality

EU 2: There is a precise order to solving multi-step equations and inequalities.

- Apply the five steps to solving multi-step equations to isolate a variable
- Isolate a variable by moving the variable to one side of an equation or inequality

EU 3: A compound inequality uses the words “and” and “or” to consider inequalities simultaneously.

- Differentiate the meanings of compound inequalities using “and” and compound inequalities using “or” and use this to graph the solution

EU 4: Equations can have one solution, no solution, or infinitely many solutions

- Simplify expressions and move the variable to one side of the equation to solve a multi-step equation
- Apply the five steps to solving multi-step equations to isolate a variable and determine how many solutions exist

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Standards

Common Core State Standards:

- **7.EE.B.4.B:** Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p , q , and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.
- **8.EE.C.7:** Solve linear equations in one variable.
- **8.EE.C.7. A:** Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).
- **8.EE.C.7. B:** Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
- **HS.A.REI.B.3:** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
- **HS.A.CED.A.1:** Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

ISAAC Vision of the Graduate Competencies

- Competency 1:** Write effectively for a variety of purposes.
Competency 2: Speak to diverse audiences in an accountable manner.
Competency 3: Develop the behaviors needed to interact and contribute with others on a team.
Competency 4: Analyze and solve problems independently and collaboratively.
Competency 5: Be responsible, creative, and empathetic members of the community.

Unit Content Overview

1. Inequalities and Their Graphs

- Differentiate inequality symbols
- Write inequalities
- Identify solutions by evaluating
- Graph an inequality on a number line
- Write an inequality from a graph
- Vocabulary: arrow, coefficient, compare, inequality, integer, infinity number line, rational number, solution set, variable

2. Solving One, Two, and Multi-Step Equations and Inequalities

- Solve a one- and two-step equation and inequality
- Simplify expressions by combining like terms to solve equations and inequalities

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- Apply the distributive property when solving equations and inequalities
- Solve an equation and inequality that contains fractions
- Solve an equation and inequality that contains decimals
- Vocabulary: additive inverse property, addition equality property, coefficient, constant, cross-multiplication, distributive property, division equality property, isolate the variable, leading coefficient, leading term, like terms, multiplicative identity property, multiplicative inverse property, multiplication equality property, one solution, place value, proportion, subtraction equality property, symmetric property, term, variable

3. Solving Multi-Step Equations with Variables on Both Sides

- Solve an equation with variables on both sides
- Solve an equation that requires distributing and/or combining like terms with variables on both sides
- Vocabulary: additive inverse property, additive identity property, addition equality property, coefficient, constant, cross-multiplication, descending order, distributive property, division equality property, isolate the variable, leading coefficient, leading term, like terms, multiplicative identity property, multiplicative inverse property, multiplication equality property, one solution, place value, proportion, rational number, simplest form, substitution property, subtraction equality property, symmetric property, term, variable

4. Compound Inequalities

- Write a compound inequality
- Solve a compound inequality involving “and/or”
- Vocabulary: additive inverse property, additive identity property, addition equality property, arrow, brackets, coefficient, compound inequality, distribute, distributive property, division equality property, inequality, infinity, integer, intersection, isolate the variable, leading coefficient, leading term, like terms, multiplicative identity property, multiplicative inverse property, multiplication equality property, multiplicative identity property, multiplicative inverse property, number line, rational number, simplest form, solution set, subtraction equality property, symmetric property, term, union, variable

5. Solving Equations with Special Cases

- Determine if an equation has one solution, no solution, or infinitely many solutions
- Vocabulary: additive inverse property, additive identity property, addition equality property, coefficient, constant, distributive property, division equality property, isolate the variable, leading coefficient, leading term, like terms, multiplicative identity property, multiplicative inverse property, multiplication equality property, one solution, no solution, infinitely many solutions, place value, simplest form, subtraction equality property, symmetric property, term, variable

Interdisciplinary Connection:

- Language Arts - Word Problems
- Science – Word Problems

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Daily Learning Objectives with TWPS Activities

Students will be able to...

- Solve and explain one and two-step equations in one variable
 - TWPS – *What is the error in the student’s work? Explain using mathematical reasoning.*
- Apply the distributive property to simplify expressions and solve equations
 - TWPS – *What does the term “distribute” mean? How would you distribute the term in this equation? Explain using mathematical reasoning.*
- Combine like terms to simplify expressions and solve equations.
 - TWPS – *Which of the equations does not belong with the rest? Explain using mathematical reasoning.*
- Translate real-world problems into one and two-step equations.
 - TWPS – *Find the error in solving the one and two-step equation. Explain using mathematical reasoning.*
- Write, graph, and identify solutions to inequalities.
 - TWPS – *How can you explain the steps to solve a two-step equation? Explain using mathematical reasoning.*
- Solve and explain one and two-step inequalities and graph their solutions.*
 - TWPS – *How could we determine if a number is a solution to an inequality? Explain using mathematical reasoning.**
- Translate real-world problems into one and two-step inequalities.
 - TWPS – *Find the error in solving the one and two-step inequality. Explain using mathematical reasoning.*
- Solve and graph compound inequalities containing “and” and “or.”*
 - TWPS – *What do you think the solution to a compound inequality will look like? Explain using mathematical reasoning.**
- Apply inverse operations in the correct order to solve multi-step equations in one variable
 - TWPS – *Which of the three statements about solving equations is a lie? Explain using mathematical reasoning.*
- Solve and justify equations with a variable on both sides of the equal sign
 - TWPS - *What is the error in the student’s work in solving this equation? Explain using mathematical reasoning.*
- Apply inverse operations in the correct order to solve multi-step equations with variables on both sides of the equal sign.
 - TWPS – *How can you explain the steps needed to solve this equation? What math vocabulary did you use? Explain using mathematical reasoning.*
- Solve and justify equations that have one solution, no solution, or infinitely many solutions.
 - TWPS – *Describe the difference between an equation with one solution, no solution, and infinitely many solutions. Explain using mathematical reasoning.*

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Instructional Strategies/Differentiated Instruction

- Whole-group instruction
- Creating authentic connections for students
- Rephrasing and restatement of information and concepts
- Guided notes
- Student-led instruction
- Independent problem-solving
- Collaborative problem-solving
- Cross-curricular problem solving (independent and collaborative)
- Accountable Talk
- Manipulatives
- Cumulative Homework
- Visuals to support instruction
- Small group instruction
- Pre-teaching and reteaching
- Multiplication charts
- Number lines
- Explicit instruction
- Color-coding
- Small group check in
- Differentiated homework assignments
- Differentiated assessments

EL DIFFERENTIATED INSTRUCTION:

- Word Walls with visuals
- TWPS (Think, Write, Pair, Share)
- Pre-reading strategies
- Culturally responsive teaching
- Explicit Modeling
- Key Vocabulary
- Graphic Organizers
- Strategic Grouping
- Non-verbal Assessments

Assessments

FORMATIVE ASSESSMENTS:

- Accountable Talk Discussions
- Daily Think-Write-Pair Share (TWPS)
- Daily Do Now
- Whiteboards
- Mid-class check-ins

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- Exit Slips
- Cumulative Homework
- Performance Task – Minecraft
 - Problem Solving Rubric

SUMMATIVE ASSESSMENTS:

- Edulastic Quiz 1 – EU 1 & EU 2
- Edulastic Quiz 2 – EU 3 & EU 4
- Unit 2 Test – EU 1 through EU 4
- Performance Task – Minecraft

Unit Task

Unit Task Name: Minecraft

Description: Students will use information learned in this unit about how there are properties that can be used to simplify mathematical expressions (EU 1), how inverse operations can be used to solve linear equations and inequalities (EU 1), and how there is a precise order to solving multi-step equations and inequalities (EU 2) in order to complete a set of tasks specific to coding a Minecraft game. Students will be investigating features of the video game and how two characters' performances compare. They will be asked to write and solve a series of problems as well as review and apply the algebraic terms and concepts learned in this unit.

Evaluation: Problem Solving Rubric

Unit Resources

- Worksheets
- Calculator
- Laptops
- SBAC Prep Online
- Edulastic
- Khan Academy
- Gimkit
- Quizizz
- Individual Whiteboards
- 2 Truths & One Lie
- State Common Core Standards Transition Tasks
- Online resources