

03 Solving Inequalities

Content Area: **Mathematics**
Course(s):
Time Period: **Week1**
Length: **5 Weeks**
Status: **Published**

Stage 1: Desired Results

Unit Overview/ Rationale

Inequalities can be solved by reasoning about the properties of inequality. Many, but not all of the properties of equality hold true for inequalities (ie: inequality symbols are reversed when multiplying or dividing both sides of an inequality by a negative number) Solutions to an inequality can be written in many forms.

Standards & Indicators

CommonCore: Mathematics, CommonCore: Grade 8, Mathematical Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 1. Make sense of problems and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- 3. Construct viable arguments and critique the reasoning of others.
- 4. Model with mathematics.
- 5. Use appropriate tools strategically.
- 6. Attend to precision.
- 7. Look for and make use of structure.
- 8. Look for and express regularity in repeated reasoning.

MA.6.6.EE.B.5

Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or

	inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
MA.9-12.A-REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
MA.7.7.EE	Expressions and Equations
MA.7.7.EE.B.4b	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.
MA.6.6.EE.B.8	Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.
MA.6.6.EE	Expressions and Equations
MA.9-12.A-CED.A	Create equations that describe numbers or relationships
MA.9-12.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
MA.9-12.A-CED.A.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
MA.9-12.A-REI	Reasoning with Equations and Inequalities
MA.7.7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

Big Ideas - Students will understand that...

-Graphs and equations and inequalities are alternative (and often equivalent) ways for depicting and analyzing patterns of change.

-Functional relationships can be expressed in real contexts, graphs, algebraic equations and inequalities, tables, and words; each representation of a given function is simply a different way of expressing the same idea.

-The value of a particular representation depends on its purpose.

Essential Questions - What provocative questions will foster inquiry and transfer of learning

-How can we use mathematical models to construct meaning for inequality situations?

-How can patterns, relations, and functions be used as tools to best describe and help explain real-life inequality situations?

Content - Students will know...

Key concepts:

inequality, compound inequality, absolute value equations, absolute value inequalities, set-notation, element of a set, complement of a set, interval notation

Skills - Students will be able to...

-Solve and graph one-step and multi-step inequalities

-Solve and graph compound inequalities

-Write inequalities and compound inequalities based on given information

-Use set notation to write solutions to an inequality

-Model naturally occurring phenomenon linear inequalities and absolute value in one variable

-Solve and graph absolute value equations in one variable

Stage 2: Assessment Evidence

Assessment

Stage 3: Learning Plan

Learning Activities

Suggested Activities:

Students solve one-step and two-step linear inequalities, graph inequalities, and write inequalities from a given scenario. □ Included will be dividing by a negative value to reverse the inequality symbol.

Formative Assessment:

Teacher observation of student work in small-group and independent practice.

□

Closure/Exit Slip: □ Students will be asked to create an inequality which will have a reversed inequality symbol when solved. □ Students will trade with a partner to solve and graph the inequality.

□

Example:

Solve the inequality $7 - 2x > 15$ and graph the solution on a number line.

Sample Solution:

$$7 - 2x > 15$$

$$-2x > 8$$

$$x < -4$$

Suggested Activities:

Students solve and graph multi-step inequalities. □ Students will analyze problems and write multi-step inequalities based on the information given. □ They will also determine when it is appropriate to use inequalities and when it is appropriate to use equations to model a situation.

Formative Assessment:

Teacher observation of student work in small-group and independent practice.

Closure/Exit Slip: □ Students will be asked to solve a multi-step inequality.

Example:

□ Solve the inequality $-2x + 9 < -2(x - 3)$

Sample Solution:

$$-2x + 9 < -2(x - 3)$$

$$-2x + 9 < -2x + 6$$

$$9 < 6$$

No solution because 9 is not less than 6.

Suggested Activities:

Students write solutions in set notation and interval notation.

Formative assessment: □

Teacher observation of student work in small-group and independent practice.

Closure/Exit Slip: □ Students will be asked to write solutions of an inequality in set notation.

Example:

□ If N is the set of even numbers that are less than or equal to 12, write N in set notation. □

□

Suggested Activities:

Students will use Venn Diagrams to answer questions about a group in order to understand the difference between statements with *and*, and statements with *or*. □ Class may form a survey question that has 2 distinct categories, which will allow for some overlap (example: □ students taking art class and students taking music class). □ Teacher generated exercises distinguishing between *and* statements and *or* statements

Class may also create a human number line representing values on a number line based on a real situation.

□

Formative Assessment:

Create a diagram which involves 2 distinct categories and allows for some overlap (intersection of the sets). Explain the meaning of statements that use the word *and*, as well as statements that use the word *or*. Explain how these types of statements may represent the data in a set.

Suggested Activities:

Students will solve and graph compound inequalities. Also, students will write compound inequalities based on given information and understand the difference between the intersection and the union of the solution sets.

Teacher generated activity demonstrating how to find solutions to compound inequalities by using the graphing calculator.

Formative Assessment:

Teacher observation of student work in small-group and independent practice.

Closure/Exit Slip:

Example:

write and graph a compound inequality for the temperatures in °C when water is a liquid.

Example:

Write and graph a compound inequality for the temperatures in °C when water is a nonliquid.

Example:

Solve and graph the compound inequality:

$1 < -2x + 3 < 19$

Suggested Activities:

Students will solve absolute value equations and understand the concept of absolute value through distances and error

intervals. □ (For example: □ a basketball must be inflated to a pressure of 8 psi with an absolute error of 0.5 psi.) □

□

Formative Assessment:

Teacher observation of student work in small-group and independent practice.

□

Sample Assessment Questions: □

Solve equations in the following forms:

$|ax + b| = c$, $a|x + b| = c$, $|ax| + b = c$, $|ax + b| + c = d$

Resources

Pearson Algebra 1 c. 2012

Chapter 3 - Solving Inequalities