

Writing and Solving Inequalities

Summary

Write and solve simple inequalities.

Main Core Tie

Secondary Mathematics I

[Strand: ALGEBRA - Reasoning With Equations and Inequalities \(A.REI\) Standard A.REI.3](#)

Materials

- [Overheads](#)
(attached)
- Graphing calculators
- 3 x 5 cards with inequalities written on them
- Journal handout: [Solving Inequalities Flow Chart](#)

Background for Teachers

Enduring Understanding (Big Ideas):

Writing and Solving inequalities

Essential Questions:

How can an equation or inequality can be used to represent a given situation?

How is solving an inequality similar to solving an equation?

How is it different from solving an equation? Why is the inequality symbol reversed when the inverse operation involves multiplying or dividing by a negative number?

Skill Focus:

Isolating the variable

Solving an inequality

Vocabulary Focus:

Inequality, is less than, is greater than, inequality symbol $>$ $<$

Ways to Gain/Maintain Attention (Primacy):

real world connections, pictures, game, comparing, movement, journal, cooperative learning

Instructional Procedures

Starter:

Solve and check:

$$3x - 8 = 2x - 4$$

$$\frac{1}{2}b + -3 = 2$$

$$-2(2x + 5) = -18$$

Lesson Segment 1: How can an equation or inequality can be used to represent a given situation?

A. Post vocabulary on Word Wall. Have students look at the vocabulary and tell a partner something they know about one of the vocabulary words.

Tell students they will need to understand inequalities before they can get a driver's license. Show them the overhead picture of a speed limit sign (attached). Write words to describe the inequality, then math symbols to represent the speed.

Other examples of inequalities in real-life can be found in advertising. Have them write words and symbols for the home prices sign (attached).

Another example for an inequality is the minimum height sign at an amusement park. Discuss words and write words and symbols for $h \geq 42$ ".

Have each student write the words and the inequality for a real-world situation. Then, do Mix-Freeze-Pair, where student mix around the room until you say, "Freeze". They stop by a partner and share their inequality. Partners write the inequalities, so that after four rounds of mixing, freezing and sharing, they will have an additional four examples of inequalities from real-world situations.

B. Do Breathless Comparisons as follows:

Tell students they will be participating in a breath-holding contest to see how many second they can hold their breath. Watch the clock and count the seconds as they hold their breath as long as they comfortably can. When they release their breath, they should write the number of seconds they held their breath. Have them take and release two deep breaths, then say "Go" and begin counting seconds.

Once all have held, released and recorded their breath. ask the person who held their breath the longest to state their seconds. Have students use their own initial as a variable and write an inequality comparing their time to the winner's time (ex. $J < 90$). Then, ask one student who was neither the first to release nor the last to tell how long they held breath (ex. 30 seconds). Using a variable to represent that students time, have students write an inequality comparing their breath to that student=s ($35 > x$).

Next, have them ask a person sitting by them how long that person held their breath and write an inequality using their initial as the variable to represent their time and comparing to the number of seconds for the other person. Have several students tell how their inequality statement represents this information.

Then ask, What if we added 10 seconds to our own time and compared that to the winner's time. How might we write that expression (ex. $L + 6 < \text{or} > 90$)? Would our inequality symbol be the same as it was the first time we compared? "What if you doubled your time and subtracted 15 seconds from it? What would the inequality comparing your time to the winner's time look like (ex. $2J - 15 < \text{or} > 90$)? Tell them you will solve an inequality to find a reasonable time for someone. Use one of their inequalities and solve it. Ask, who has a time that would be reasonable as a solution for the inequality you modeled solving (ex. $2j - 15 > 90$, so $j > 52.5$). Who has a solution that would be reasonable here?

Integers, rational numbers and several operations may be used may be used in the expressions to set up several inequalities using operations on their initial compared to the time of the winner or any other time. For example:

$$-4 + x$$

$$2x + 10$$

$$x + 2x - 30$$

Lesson Segment 2: Finding reasonable solutions to an inequality

One way to find reasonable solutions to an inequality is to guess. Play the following game:

Name That Number (Writing and Graphing Inequalities)

Divide the class into two teams. Tell them you have stored a number you want them to guess. The number is between -25 and 25 (or choose any range appropriate for the class). Have each team bid for the number of questions they will need to ask you in order to guess the number (ex. "We can name that number in 5 questions!). The team who bids the lowest, begins asking questions.

Questions must be in the form of an inequality such as, Als x less than 0?@ As the question is asked, you write an inequality for that question such as $x < 0$. The team continues to ask all the questions for their bid. Then, they must accurately guess the number. If they are able to guess the number correctly after their last question, they earn a point. If not, the opposing team gets to ask the number of additional questions to reach their bid, then, guesses the number.

MICHELLE THE FOLLOWING PARAGRPH HAS GRAPHICS IN IT

Have students write inequalities for each guess so that the inequality symbol shows the correct response. For example, if a team asked, "Is x less than 0, and that was not true, the class would write

0 x 25. Begin by having them write $-25 < x < 25$. Type the question into the calculator and press enter to check for yes (1) or no (0). Have them write a new inequality for each guess.

(Calculator steps): Teacher types a number, then X I b. To enter a student's question, type -1 and cursor down to x. Next cursor to the inequality symbol, push b, type the number, cursor to "done", b. 0 or 1 indicates the probability the guess is correct. Or in other words 0 is no, and 1 is yes.

Lesson Segment 3: How is solving an inequality similar to solving an equation? How is it different from solving an equation? Why is the inequality symbol reversed when the inverse operation involves multiplying or dividing by a negative number?

A. Put this two-column comparison on the board, and ask students to find the rule for the expressions in each column: (expressions on left show x being multiplied or divided by a positive number. Those on the right by a negative number)

2x	-2x
4x	x/-5
x/5	x/-6
8x	-8x
-10 + x	
X -- 4	

B) Have students write each of the following inequalities one at a time as you give them. Have them guess a reasonable solution and write their guess. Then ask them to replace the inequality symbol with an equal sign and solve the equation using inverse operations. Then, replace the inequality symbol and check the solution for reasonableness in the inequality. Then graph the solution on a number line. Discussion Think-Team-Share Q. For which operations was the solution not reasonable? Why is that? (Discuss the need to reverse the inequality symbol when multiplying or dividing by a negative integer.)

C + 3 < 12
C 3 > 12
3C < 12
C/3 > 12
C + (-3) < 12
C (-3) > 12
-3C < 12
C/-3 > 12

Segment 4 Practice solving inequalities and graphing solutions

TIC TAC TOE Game Practice. Have students sketch a large 3x3 table on their paper, or copy the attached handout. The cells in the table must have space to write a problem, solve, and graph the solution. Have them copy the following problems into the cells in any order. They should work with a partner or team to solve all the problems. Then, read the answers out of order and have students put a big C each time they see a correct answer in their Tic Tac Toe. Read until several people have three in a row. This may be assigned as homework, then the answers read at first of next class.

$2n + (-7) \geq 1$ ($n \geq 4$)
 $14 < 5p$ ($-9 < p$)
 $4m + 2 < 14$ ($m < 3$)
 $3 > b/2$ ($3 > 16$)
 $3w \geq 12$ ($w \geq 4$)
 $-2r + 1 > 5$ ($r > -2$)
 $6 < -2s$ ($-3 > s$)
 $W + 4 \geq 10$ ($w \geq 6$)
 $x/-3 < 9$ ($x > -3$)

Journal

Assign student to complete the flow chart for solving inequalities.

Assessment Plan

performance, questions, observation

Bibliography

This lesson plan was created by Linda Bolin.

Authors

[Utah LessonPlans](#)