

# Solving Inequalities

## Summary

Students will solve inequalities

## Main Core Tie

Secondary Mathematics I

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

## Materials

Transparencies for inequalities (attached)

Tic Tac Toe worksheet

Journal page: Solving Inequalities

True/False Student Response Cards.

## Background for Teachers

Enduring Understanding (Big Ideas):

Solving inequalities

Essential Questions:

How can a real-world situations can be represented by an inequality?

How is solving an inequality similar to solving an equation? How does solving an inequality differ from solving an equation?

When solving an inequality, what operations require me to reverse the inequality symbol?

Skill Focus:

Solving inequalities

Vocabulary Focus:

inequality, inequality symbol,  $<$ ,  $,$ ,  $>$ ,

Ways to Gain/Maintain Attention (Primacy):

cooperative discussion, role playing, contest, games, predicting, Student Response Card Technology

## Instructional Procedures

Starter:

Solve and check:

$$3x - 8 = 4$$

$$2. \frac{b}{2}$$

$$+ -3 = 2$$

$$2$$

Lesson Segment 1: How can real-world situations be represented by an inequality?

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). Help students write an inequality for the speed limit sign.

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

Another example for an inequality is the minimum height sign at an amusement park. Write an inequality for a sign that says, "You must be at least 42 inches tall to ride this attraction", or "You must be in bed by 9" or, "Your GPA must be at least 2.0 or you're grounded"!

Have each student write a situation that suggests an inequality and write an inequality to represent that inequality. Do Mix-Freeze-Pair, where students mix around the room until you say, "Freeze". They stop by a partner and share their inequality. Students write the inequality for their partner on their paper, so that after four rounds of mixing, freezing and sharing, they will have an additional five examples of inequalities from real-world situations.

Reasonable solutions

Q. Referring to earlier examples. How many inches tall could you be and still ride the amusement ride? What time could you go to bed? What speed could you go if the limit was 35 mph? How many possible solutions for  $m < 4$ ? Help student understand that the inequality symbol gives us a limit or starting place.

Use the following real-world situations and inequalities to help students see reasonable solutions. Ask students to role play each situation. Have students go around their teams giving a reasonable number. Then ask for a few solutions.

1. If you have \$20 you could spend, and you have spent 5 dollars, how much more might you be able to spend? Have them write the inequality  $X + 5 \leq 20$ .

2. You can ride an attraction where you must be at least 42 inches tall, but your little brother can't. You know you are more than twice as tall as your little brother. How tall could your brother be?  $2b < 42$ .

One way to see reasonable solutions to an inequality is to guess and graph using a number line.

Play the following game:

Name That Number (Writing and Graphing Inequalities)

Divide the class into two teams. Tell them you have stored a number in the graphing calculator that you want them to guess. The number is between -25 and 25 (or choose any range appropriate for the class level). 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, "Is  $x$  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.

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  $x \geq 0$ . Begin by having them write  $x > -25$  and  $x < 25$ . 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, and stores that number as X. Teacher clears the home screen, so students can't see the number. To enter a student's question, press the 2nd MATH keys and cursor down to  $x$ . Next cursor to the inequality symbol, and ENTER, type the number, cursor to "Done", and press ENTER, ENTER. 0 or 1 indicates the probability the guess is correct. Or in other words 0 is no, and 1 is yes.

Lesson Segment 2: How is solving an inequality similar to solving an equation? How is it different from solving an equation? When solving an inequality, what operations would require me to reverse the inequality symbol to make the statement true?

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. Have students hold up the True/False Student Response Cards (attached). Discuss the reason they may not have a true inequality. Then graph the solution on a number line.

$$C + 3 < 12$$

$$C - 3 > 12$$

$$3C < 12$$

D.  $\frac{C}{3}$

$$> 12$$

$$3$$

$$C + (-3) < 12$$

$$C - (-3) > 12$$

$$-3C < 12$$

H.  $\frac{C}{-3}$

$$> 12$$

$$-3$$

Discuss for which operations the solution was not reasonable. Explain how that can be fixed by reversing the inequality of the solution. Reverse the inequality and have students choose a number and check it in the original inequality. (Discuss the need to reverse the inequality symbol when multiplying or dividing by a negative integer.)

To help students practice identifying when the inequality symbol should be reversed, have them use True/False Student Response cards as you show a few examples of inequalities telling the students you think you should reverse the inequality sign. They must decide if that is true for the inequality you show, or if that is false.

Lesson Segment 3 Practice solving inequalities and graphing solutions

TIC TAC TOE Game Practice.

Give students the Tic Tac Toe handout (attached) out. 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.

Journal

Assign student to complete the flow chart for solving inequalities.

Assessment Plan

observation, performance task, journal

Bibliography

This lesson plan was created by Linda Bolin.

Authors

[Utah LessonPlans](#)