Lesson 14

NAME:

Solving and Graphing Radical Inequalities

Start by navigating to the Online Lesson for instructions.

Objectives

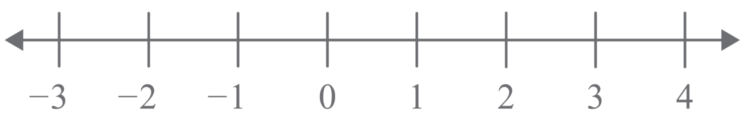
- Solve for the values that make the principal root true. (Name the restrictions on the radicand.)
- Solve a radical inequality.
- Graph the solution to a radical inequality on a number line.

Why?

There are many real-world scenarios in which you need at least x-amount of something or no more than x-amount of another. Inequalities allow you to work with a range of values to solve problems.

Warm Up

1) Plot the set of numbers on the number line. $\left\{\sqrt{16}, \sqrt{0}, -\sqrt{9}, -\sqrt{1}, \sqrt{4}, \sqrt{3}\right\}$



2) Solve the inequality.
$7 - 2x > 15$

To continue, return to the Online Lesson.

Explore

Solving Square Root Inequalities

Fill in the notes as you watch the video in the Online Lesson.

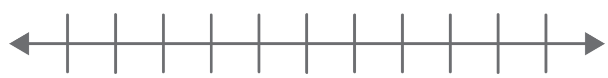
- Radical inequalities are solved using the ____________________ as radical equations.
- Recall that when you multiply or divide by a negative number, the ____________________ of the inequality symbol ____________________.
- Because inequalities represent a ____________________ as the solution, it is important to check that all values are true for the ____________________ as well as the entire inequality.

- Before solving square root inequalities, first check the radicand for principal root ________________________, because the principal root is a non-negative.
  - Set each radicand to ______________, then solve.
- Now, solve the given ______________________.
  - Compare the radicand inequalities to the solution to determine which combination of the results produces the _____________________________ answer.
  - Any result that is found outside of the most restricted combination is ________________________________.
  - If the solution is false for the restrictions of the principal root, there is _______________________________.

Example 1

Complete the example as you watch the video in the Online Lesson.

Solve. Graph the solution on a number line.



$2+\sqrt{5x+10}<7$

Implement Restrictions

$5x+10\geq 0$

$5x\geq -10$

$x\geq -2$

Solve

$\sqrt{5x+10}<5$

$\left(\sqrt{5x+10}\right)^2<(5)^2$

Explain

- All values must be greater than or equal to −2 so that the principal root is true
- Isolate the radical expression
- Square both sides
- Solve for x
- Use the restriction on the radicand and the answer to the given problem to determine all solutions

Example 2

Complete the example as you watch the video in the Online Lesson.

Solve. Graph the solution on a number line.

$\sqrt{2x-2} \geq \sqrt{5x}$

Implement

Restrictions

$2x - 2 \geq 0$ $\quad$ $5x \geq 0$

$2x \geq 2$ $\quad$ ~~$x \geq 0$~~

$x \geq 1$

Solve

Explain

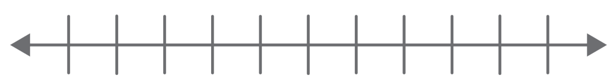
- The restriction should be true for both radicand inequalities.

Example 3

Complete the example as you watch the video in the Online Lesson.

Solve. Graph the solution on a number line.

$8 + \sqrt{2x-5} \geq 3$



Example 4

Complete the example as you watch the video in the Online Lesson.

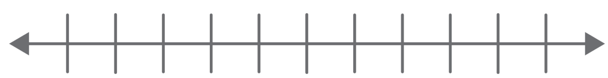
Solve. Graph the solution on a number line.

$\sqrt{x+6} \geq 2 - \sqrt{x}$

Checkpoint: Solving Square Root Inequalities

Solve. Graph the solution on a number line.

$-6 + \sqrt{9-5x} \geq 2$



To continue, return to the Online Lesson.

Practice 1

Complete problems on a separate sheet of paper.

Use one of the following to complete the sentence: always, sometimes, never.

1) The restrictions on the radicand __________________ create a lower or upper boundary when the solution is graphed on a number line.

2) The principal root can __________________ be less than zero.

Solve. Graph the solution on a number line.

3) $\sqrt{2x-7} \le \sqrt{x+3}$

4) $-\sqrt{5x-9}+7 \le -4$

5) $9+2\sqrt{x-1} \ge 1$

6) $\sqrt{x+3} \le 1-\sqrt{x+5}$

7) $\sqrt{3x+9} < \sqrt{x+23}$

8) $-10-\sqrt{12x+7} \ge -2$

9) $1 > \sqrt{3-x}$

10) $-5+\sqrt{\frac{3}{4}x-2} \le 2$

11) $\sqrt{\frac{2}{5}x-8} < \sqrt{\frac{1}{4}x-1}$

12) $2+\sqrt{3x-6} < \sqrt{3x+1}$

To continue, return to the Online Lesson.

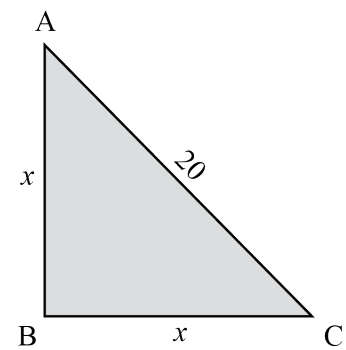
Mastery Check

Show What You Know

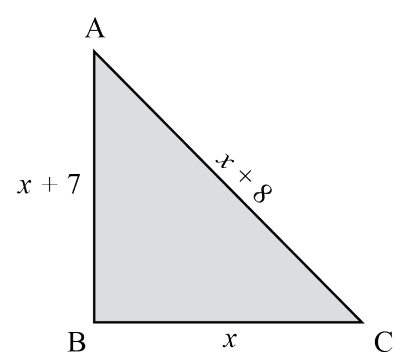
Triangles can be classified by their angle measure as acute, right, or obtuse. If the side lengths of a triangle are known, the angle classification can be determined by these formulas:

acute	**right**	**obtuse**
$c < \sqrt{a^2 + b^2}$	$c = \sqrt{a^2 + b^2}$	$c > \sqrt{a^2 + b^2}$

A) Show all work to determine the value of x that will form a right triangle for the given figure. Write the solution in simplified radical form.



B) Using the figure, determine the values of x that will form an acute triangle.



Say What You Know

In your own words, talk about what you have learned using the objectives for this lesson and your work on this page.

To continue, return to the Online Lesson.

Practice 2

Complete problems on a separate sheet of paper.

Solve. Graph the solution on a number line.

1) $\sqrt{x+9} > \sqrt{3x+2}$

2) $5 - 3\sqrt{x} > -4$

3) $7 < \sqrt{2x-3}$

4) $\sqrt{2x-4} \geq 3 - \sqrt{2x-1}$

5) $\sqrt{6x+8} \leq \sqrt{9x+2}$

6) $\sqrt{x} + 8 \geq \sqrt{x-6}$

7) $4 > \sqrt{6-2x}$

8) $2 + \sqrt{\frac{1}{2}x + 2} < -10$

9) $3 + \sqrt{\frac{1}{2}x} < \sqrt{\frac{1}{2}x + 12}$

10) $-3 - \sqrt{\frac{1}{3}x + 9} \geq -12$

To continue, return to the Online Lesson.