

Key

# 6.7 Solving Radical Equations & Inequalities - Day 2 Notes

Objective: Solving radical inequalities.

Solution must satisfy both sides

Radical inequalities are those that contain a variable under the radical sign.

### Steps to solve radical inequalities:

1. If the index of the root is even, identify the values of the variable that will make the radicand positive. (Set the expression under the radical sign  $\geq$  zero and solve.)
2. Solve the inequality algebraically.
3. Check your solutions.

Ex. #1 Solve:  $\sqrt{x-4} \leq 2$

Step 1:  $x-4 \geq 0$   
 $x \geq 4$



$[4, 8]$

Check: if  $x=5$

$\sqrt{5-4} \leq 2$   
 $\sqrt{1} \leq 2$  ✓

Step 2:  
 $(\sqrt{x-4})^2 \leq 2^2$

$x-4 \leq 4$

$x \leq 8$

1.  $\sqrt{2x-1} < 5$

Step 1:  $2x-1 \geq 0$   
 $2x \geq 1$   
 $x \geq 1/2$



$[1/2, 13)$

Step 2:  
 $(\sqrt{2x-1})^2 < 5^2$   
 $2x-1 < 25$

$2x < 26$

$x < 13$

Ex. #2. Solve:  $2\sqrt{3x-6} \leq 6$

Step 1:  $3x-6 \geq 0$   
 $3x \geq 6$   
 $x \geq 2$



$[2, 5]$

Check: if  $x=3$

$2\sqrt{3(3)-6} \leq 6$   
 $2\sqrt{3} \leq 6$  ✓

Step 2:  
 $2\sqrt{3x-6} \leq 6$   
 $\sqrt{3x-6} \leq 3$   
 $(\sqrt{3x-6})^2 \leq (3)^2$

$3x-6 \leq 9$

$3x \leq 15$

$x \leq 5$

2.  $\sqrt{c-2} + 4 \leq 7$

Step 1:  $c-2 \geq 0$   
 $c \geq 2$



$[2, 11]$

Step 2:  
 $\sqrt{c-2} + 4 \leq 7$   
 $(\sqrt{c-2})^2 \leq (3)^2$

$c-2 \leq 9$

$c \leq 11$

Ex. #3 Solve:  $\sqrt{x+6}-2 > 2$

Step 1:  $x+6 \geq 0$

$x \geq -6$

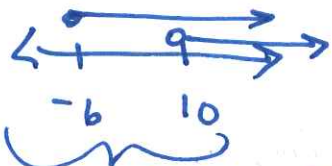
Step 2:

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

$(\sqrt{x+6})^2 > 4^2$

$x+6 > 16$

$x > 10$



must satisfy both!

$(10, \infty)$

Ex. #4 Solve:  $3\sqrt{2y+5} \geq 9$

Step 1:  $2y+5 \geq 0$

$2y \geq -5$

$y \geq -5/2$

Step 2:

$3\sqrt{2y+5} \geq 9$

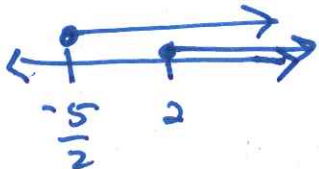
$\sqrt{2y+5} \geq 3$

$(\sqrt{2y+5})^2 \geq 3^2$

$2y+5 \geq 9$

$2y \geq 4$

$y \geq 2$



$[2, \infty)$

3.  $\sqrt{y+4}+3 \geq 6$

Step 1:  $y+4 \geq 0$

$y \geq -4$

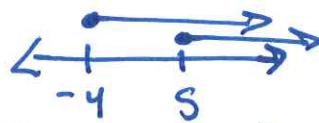
Step 2:

$\sqrt{y+4}+3 \geq 6$

$(\sqrt{y+4})^2 \geq 3^2$

$y+4 \geq 9$

$y \geq 5$



must satisfy both!

$[5, \infty)$

4.  $2\sqrt{4r-3} > 10$

Step 1:  $4r-3 \geq 0$

$4r \geq 3$

$r \geq 3/4$

Step 2:

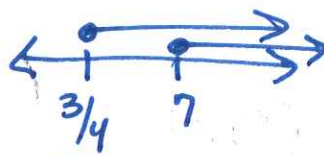
$2\sqrt{4r-3} > 10$

$(\sqrt{4r-3})^2 \geq 5^2$

$4r-3 > 25$

$4r > 28$

$r > 7$



$[7, \infty)$

Application: