

# Solving Complex Inequalities

March-27-17  
11:02 AM

## Mathematics 9 Solving Equations Solving Complex Inequalities

### A. Definition

1. Inequality: a mathematical statement comparing expressions that may not be equal.

Remember that the inequality symbol is always read from where the variable is located.

When we graph an inequality we use different types of dots to represent the different inequality symbols. When we use either  $>$  or  $<$  symbols we use an “**open dot**”. When we use  $\geq$  or  $\leq$  symbols we use a “**closed dot**”.

Last day we looked at solving simple inequalities (one and two step). Today we will take those same principles and apply them to more complex inequalities. **Remember if you divide by a negative number, however, you must remember to reverse the inequality symbol.**

### A. Examples

- 1) Solve and graph each of the following inequalities.

$$\text{a) } 4x + 6 \leq 2x + 14$$

*(Handwritten:  $-2x$  under  $4x$ ,  $-2x$  under  $2x$ )*

$$2x + 6 \leq 14$$

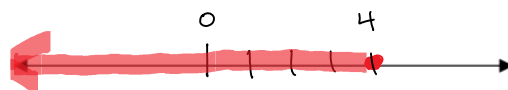
*(Handwritten:  $-6$  under  $6$ ,  $-6$  under  $14$ )*

$$2x \leq 8$$

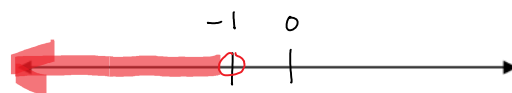
*(Handwritten:  $\div 2$  under  $2x$ ,  $\div 2$  under  $8$ )*

$$x \leq 4$$

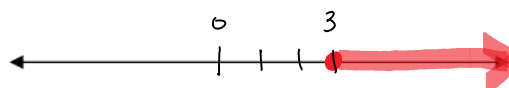
*(Handwritten: boxed equation, "less than" written below)*



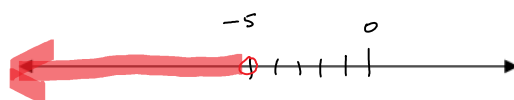
$$\begin{aligned}
 \text{b) } & (5x - 3) - (2x) > (3) + 7x - (2) \\
 & \cancel{-7x} - 3 > \cancel{7x} + 1 \\
 & -4x - \cancel{3} > \cancel{1} + 3 \\
 & \frac{-4x}{-4} > \frac{4}{-4} \\
 & \boxed{x < -1} \\
 & \text{less than}
 \end{aligned}$$



$$\begin{aligned}
 \text{c) } & 4(x+1) \geq 2(11-x) \\
 & \cancel{4x} + 4 \geq 22 - \cancel{2x} \\
 & 6x + 4 \geq 22 \\
 & \frac{6x}{6} \geq \frac{18}{6} \\
 & \boxed{x \geq 3} \\
 & \text{greater than}
 \end{aligned}$$



$$\begin{aligned}
 \text{d) } & -\frac{1}{2}(x+7) > \frac{1}{3}(2x+7) \\
 & \cdot 6 \left[ -\frac{1}{2}x - \frac{7}{2} \right] > \left[ \frac{2}{3}x + \frac{7}{3} \right] \cdot 6 \\
 & \cancel{-4x} - 21 > \cancel{4x} + 14 \\
 & -7x - \cancel{21} > \cancel{14} + 21 \\
 & \frac{-7x}{-7} > \frac{35}{-7} \\
 & \boxed{x < -5} \\
 & \text{less than}
 \end{aligned}$$



Assignment: Solving Complex Inequalities Assignment

Name: \_\_\_\_\_

Solving Complex Inequalities Assignment

Solve and graph the following inequalities.

1.  $5 + x > 7$



2.  $3x + 2 \leq 20$



3.  $6 - 2x \geq 10$



4.  $-7 > -2 - x$



5.  $6x + 2 < 4x - 10$



6.  $3 - (x - 1) \leq 5 + 2(x + 4)$



7.  $2 \geq \frac{2}{3}x + 6$



8.  $4x - 6 + 2x \leq 3x - 7 + 2x$



9.  $-\frac{1}{5}(x+17) < -3$



10.  $4x - 27 < 9x - 2$



11.  $\frac{x}{3} - 4 \leq -2$



12.  $5 - 4x < -7$



13.  $\frac{1}{3}x + 1 \geq \frac{1}{2}x$



14.  $5x + 2 - 3x - 1 < 6x + 5 - 2x - 2$



15.  $\frac{x}{3} - 4 \leq -5$



16.  $\frac{1}{2}(x + 2) \geq \frac{1}{4}(x + 4) + 1$



Answers

1)  $x > 2$

2)  $x \leq 6$

3)  $x \leq -2$

4)  $x > 5$

5)  $x < -6$

6)  $x \geq -3$

7)  $x \leq -6$

8)  $x \leq -1$

9)  $x > -2$

10)  $x > -5$

11)  $x \leq 6$

12)  $x > 3$

13)  $x \leq 6$

14)  $x > -1$

15)  $x \leq -3$

16)  $x \geq 4$