6.4 Solve Compound Inequalities

Goal • Solve and graph compound inequalities.

Your Notes

VOCABULARY

Compound inequality A compound inequality consists of two separate inequalities joined by *and* or *or*.

Example 1 ***Write and graph compound inequalities***

Translate the verbal phrase into an inequality. Then graph the inequality.

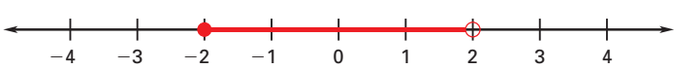
a. All real numbers that are greater than or equal to -2 *and* less than 2.

b. All real numbers that are less than or equal to 3 *or* greater than 6.

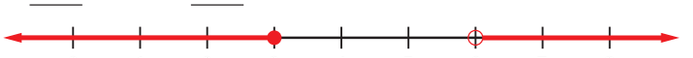
c. All real numbers that are greater than -8 *and* less than or equal to -3.

Solution

a. $-2 \underline{\leq} x \underline{<} 2$



b. $x \underline{\leq} 3$ *or* $x \underline{>} 6$



c. $-8 \underline{<} x \underline{\leq} -3$

Your Notes

Example 2 ***Solve a compound inequality with and***

Solve $15 \leq 3x - 3 < 24$. Graph your solution.

Solution

Separate the compound inequality into two inequalities. Then solve each inequality separately.

$15 \leq 3x - 3$ *and* $3x - 3 < 24$ — **Write two inequalities.**

$\underline{18} \leq 3x$ *and* $3x < \underline{27}$ — **Add $\underline{3}$ to each expression.**

$\underline{6} \leq x$ *and* $x < \underline{9}$ — **Divide each expression by $\underline{3}$.**

The compound inequality can be written as $\underline{6 \leq x < 9}$. The solutions are all real numbers $\underline{\text{greater than or equal to 6}}$ and $\underline{\text{less than 9}}$.

Example 3 ***Solve a compound inequality with and***

Solve $-15 < -7x + 1 < 50$. Graph your solution.

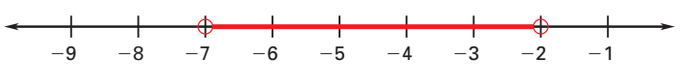
Solution

$-15 < -7x + 1 < 50$ — **Write original inequality.**

$\underline{-14} < -7x < \underline{49}$ — **Subtract $\underline{1}$ from each expression.**

$\underline{-2} > x > \underline{-7}$ — **Divide each expression by $\underline{-7}$ and $\underline{\text{reverse both inequality symbols}}$.**

The solutions are all real numbers $\underline{\text{greater than } -7}$ and $\underline{\text{less than } -2}$.



Your Notes

Example 4 ***Solve a compound inequality with or***

Solve $5x + 6 \geq -9$ *or* $2x - 8 > 12$. Graph your solution.

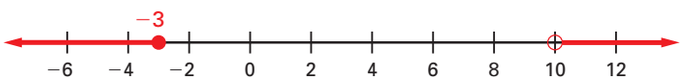
Solution

$5x + 6 \geq -9$ *or* $2x - 8 > 12$ — **Write original inequality.**

$5x \geq \underline{-15}$ *or* $2x > \underline{20}$ — **Use addition or subtraction property of inequality.**

$x \geq \underline{-3}$ *or* $x > \underline{10}$ — **Use division property of inequality.**

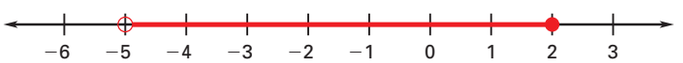
The solutions are all real numbers less than or equal to -3 or greater than 10.



✔ ***Checkpoint*** **Solve the inequality. Graph your solution.**

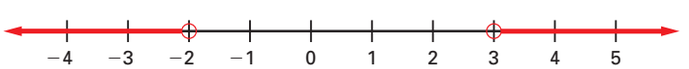
1. $-3 \geq -2x + 1 < 11$

$2 \geq x > -5$



2. $9x + 1 < -17$ *or* $7x - 12 > 9$

$x < -2$ *or* $x > 3$



Homework