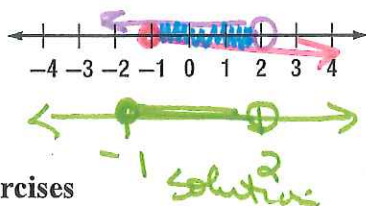


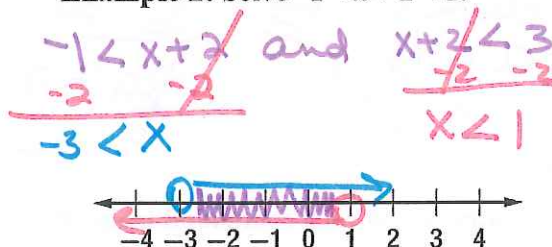
5-4 Notes Solving Compound Inequalities

Inequalities Containing and A compound inequality containing *and* is true only if both inequalities are true. It is the **intersection** of the graphs of the two inequalities. Every solution of the compound inequality must be a solution of both inequalities.

Example 1: Graph the solution set of $x < 2$ and $x \geq -1$. Then graph the solution set.



Example 2: Solve $-1 < x + 2 < 3$.

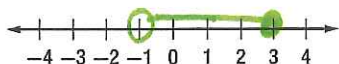


Exercises

Graph the solution set of each compound inequality.

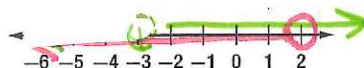
1. $b > -1$ and $b \leq 3$

must satisfy both



2. $-3 < d$ and $d < 2$

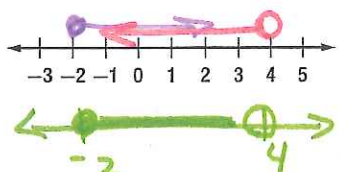
$d > -3$



solution

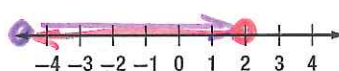
3. $-2 \leq p < 4$

$p < 4$ and $p \geq -2$



4. $2 \geq q \geq -5$

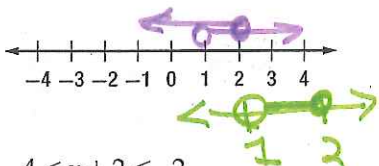
$q \leq 2$ and $q \geq -5$



Solve each compound inequality. Then graph the solution set.

5. $4 < w + 3 \leq 5$

$w + 3 > 4$ and $w + 3 \leq 5$
 $w > 1$ and $w \leq 2$



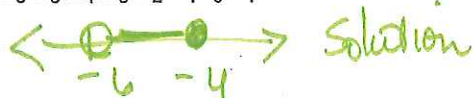
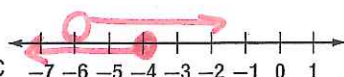
6. $-3 \leq p - 5 < 2$

$p - 5 \geq -3$ and $p - 5 < 2$
 $p \geq 2$ and $p < 7$



7. $-4 < x + 2 \leq -2$

$x + 2 > -4$ and $x + 2 \leq -2$
 $x > -6$ and $x \leq -4$



8. $-4 < 2x - 2 \leq -2$

$2x - 2 > -4$ and $2x - 2 \leq -2$
 $2x > -2$ and $2x \leq 0$
 $x > -1$ and $x \leq 0$



Solving Compound Inequalities

Inequalities Containing or A compound inequality containing *or* is true if one or both of the inequalities are true. It is the **union** of the graphs of the two inequalities. The union can be found by graphing both inequalities on the same number line.

Example: Solve $2a + 1 < 11$ or $a > 3a + 2$. Then graph the solution set.

$$\begin{aligned} 2a + 1 &< 11 \\ 2a &< 10 \\ a &< 5 \end{aligned}$$

$$\begin{aligned} a &> 3a + 2 \\ -3a &-3a \\ -2a &> 2 \\ -2 &-2 \\ a &< -1 \end{aligned}$$

$$a < -1$$

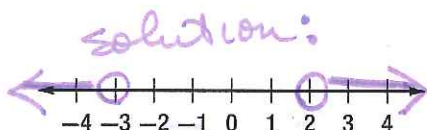
Solution: 



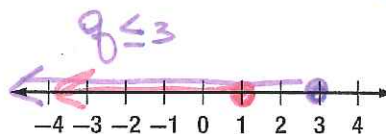
Exercises

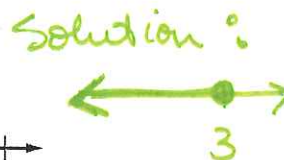
Graph the solution set of each compound inequality.

1. $b > 2$ or $b \leq -3$



2. $3 \geq q$ or $q \leq 1$

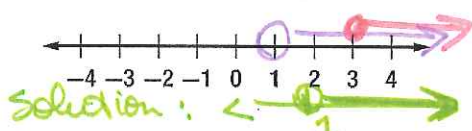


Solution: 

Solve each compound inequality. Then graph the solution set.

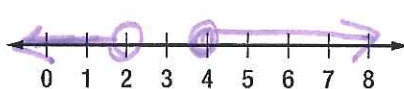
7. $3 < 3w$ or $3w \geq 9$

$$\begin{aligned} 3w &> 3 \quad \text{or} \quad 3w \geq 9 \\ w &> 1 \quad \text{or} \quad w \geq 3 \end{aligned}$$



8. $-3p + 1 \leq -11$ or $p < 2$

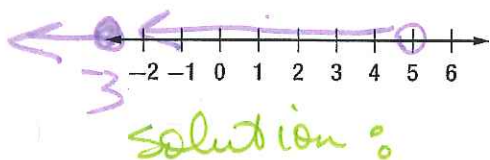
$$\begin{aligned} -3p &\leq -12 \quad \text{or} \quad p < 2 \\ p &\geq 4 \end{aligned}$$



Solution: 

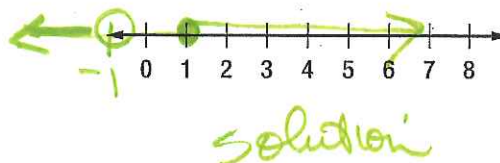
10. $2y + 2 < 12$ or $y - 3 \geq 2y$

$$\begin{aligned} 2y + 2 &< 12 \quad \text{or} \quad y - 3 \geq 2y \\ 2y &< 10 \quad \text{or} \quad -3 \geq y \\ y &< 5 \quad \text{or} \quad y \leq -3 \end{aligned}$$



12. $3a + 2 \geq 5$ or $7 + 3a < 2a + 6$

$$\begin{aligned} 3a + 2 &\geq 5 \quad \text{or} \quad 7 + 3a < 2a + 6 \\ 3a &\geq 3 \quad \text{or} \quad 7 + a < 6 \\ a &\geq 1 \quad \text{or} \quad a < -1 \end{aligned}$$



Solution: 

