NAME _____ DATE _____ PERIOD _____

6-4

Study Guide and Intervention *(continued)*

Solving Compound Inequalities

Inequalities Containing *or* A compound inequality containing *or* is true if one or both of the inequalities are true. The graph of a compound inequality containing *or* is the **union** of the graphs of the two inequalities. The union can be found by graphing both inequalities on the same number line. A solution of the compound inequality is a solution of either inequality, not necessarily both.

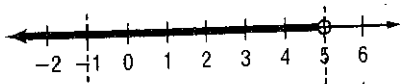
Example **Solve $2a + 1 < 11$ or $a > 3a + 2$.**

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

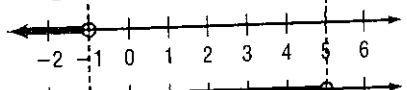
or

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

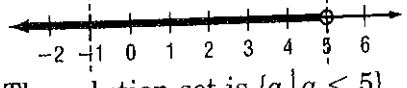
Graph $a < 5$.



Graph $a < -1$.



Find the union.

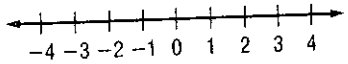


The solution set is $\{a \mid a < 5\}$.

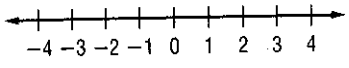
Exercises

Graph the solution set of each compound inequality.

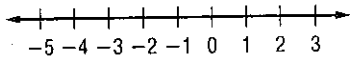
1. $b > 2$ or $b \leq -3$



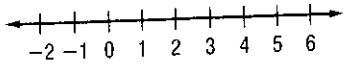
2. $3 \geq q$ or $q \leq 1$



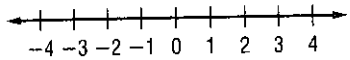
3. $y \leq -4$ or $y > 0$



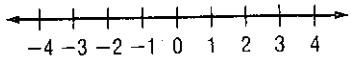
4. $4 \leq p$ or $p < 8$



5. $-3 < d$ or $d < 2$

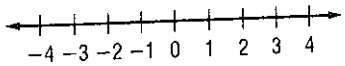


6. $-2 \leq x$ or $3 \leq x$

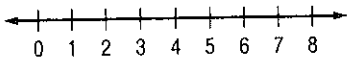


Solve each compound inequality. Then graph the solution set.

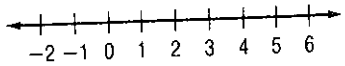
7. $3 < 3w$ or $3w \geq 9$



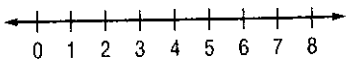
8. $-3p + 1 \leq -11$ or $p < 2$



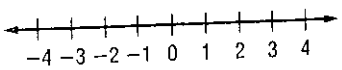
9. $2x + 4 \leq 6$ or $x \geq 2x - 4$



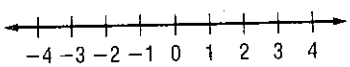
10. $2y + 2 < 12$ or $y - 3 \geq 2y$



11. $\frac{1}{2}n > -2$ or $2n - 2 < 6 + n$



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



NAME _____ DATE _____ PERIOD ____

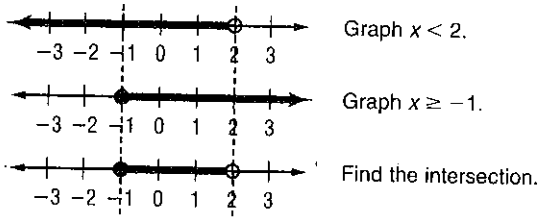
6-4

Study Guide and Intervention

Solving Compound Inequalities

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

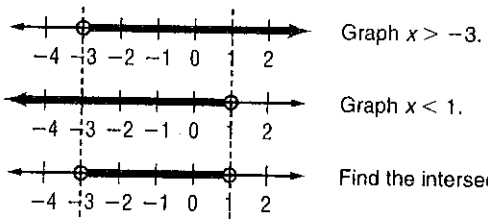
Example 1 **Graph the solution set of $x < 2$ and $x \geq -1$.**



The solution set is $\{x \mid -1 \leq x < 2\}$.

Example 2 **Solve $-1 < x + 2 < 3$ using *and*. Then graph the solution set.**

$$\begin{aligned} -1 &< x + 2 \\ -1 - 2 &< x + 2 - 2 \\ -3 &< x \end{aligned} \quad \text{and} \quad \begin{aligned} x + 2 &< 3 \\ x + 2 - 2 &< 3 - 2 \\ x &< 1 \end{aligned}$$

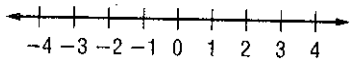


The solution set is $\{x \mid -3 < x < 1\}$.

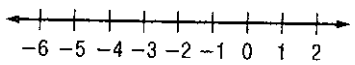
Exercises

Graph the solution set of each compound inequality.

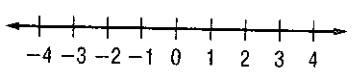
1. $b > -1$ and $b \leq 3$



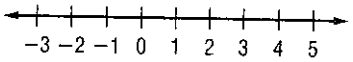
2. $2 \geq q \geq -5$



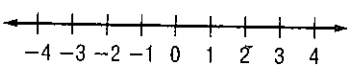
3. $x > -3$ and $x \leq 4$



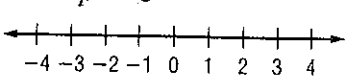
4. $-2 \leq p < 4$



5. $-3 < d$ and $d < 2$

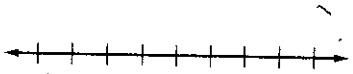


6. $-1 \leq p \leq 3$

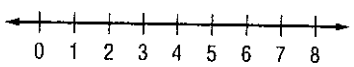


Solve each compound inequality. Then graph the solution set.

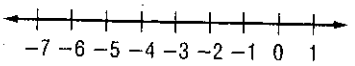
7. $4 < w + 3 \leq 5$



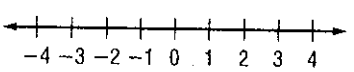
8. $-3 \leq p - 5 < 2$



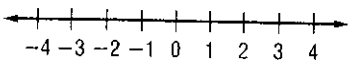
9. $-4 < x + 2 \leq -2$



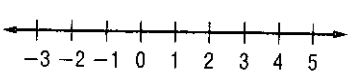
10. $y - 1 < 2$ and $y + 2 \geq 1$



11. $n - 2 > -3$ and $n + 4 < 6$



12. $d - 3 < 6d + 12 < 2d + 32$



NAME _____ DATE _____ PERIOD _____

6-5

Study Guide and Intervention

Solving Open Sentences Involving Absolute Value

Absolute Value Equations When solving equations that involve absolute value, there are two cases to consider.

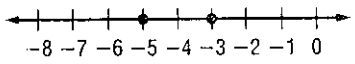
Case 1: The value inside the absolute value symbols is positive.
Case 2: The value inside the absolute value symbols is negative.

Example 1 **Solve $|x + 4| = 1$. Then graph the solution set.**

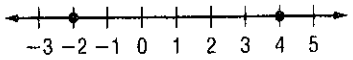
Write $|x + 4 = 1|$ as $x + 4 = 1$ or $x + 4 = -1$.

$x + 4 = 1$	or	$x + 4 = -1$
$x + 4 - 4 = 1 - 4$		$x + 4 = -1$
$x = -3$		$x + 4 - 4 = -1 - 4$
		$x = -5$

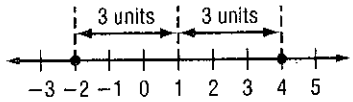
The solution set is $\{-5, -3\}$.
The graph is shown below.



Example 2 **Write an inequality involving absolute value for the graph.**



Find the point that is the same distance from -2 as it is from 4.

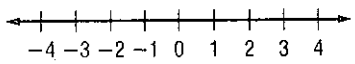


The distance from 1 to -2 is 3 units. The distance from 1 to 4 is 3 units.
So, $|x - 1| = 3$.

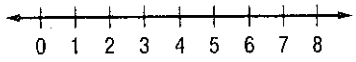
Exercises

Solve each open sentence. Then graph the solution set.

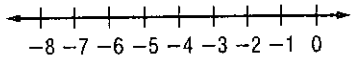
1. $|y| = 3$



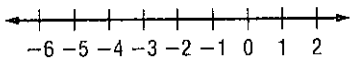
2. $|x - 4| = 4$



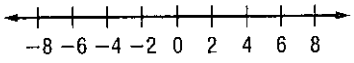
3. $|y + 3| = 2$



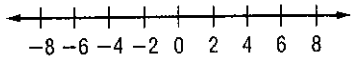
4. $|b + 2| = 3$



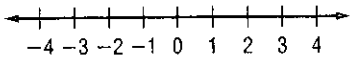
5. $|w - 2| = 5$



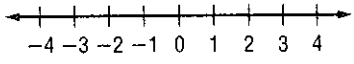
6. $|t + 2| = 4$



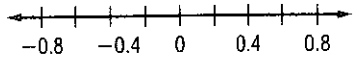
7. $|2x| = 8$



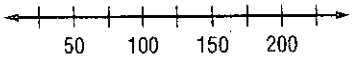
8. $|5y - 2| = 7$



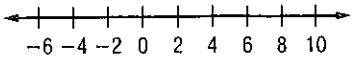
9. $|p - 0.2| = 0.5$



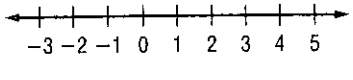
10. $|d - 100| = 50$



11. $|2x - 1| = 11$

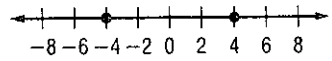


12. $\left|3x + \frac{1}{2}\right| = 6$

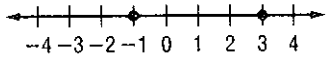


For each graph, write an open sentence involving absolute value.

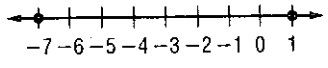
13.



14.



15.



Lesson 6-5

NAME _____ DATE _____ PERIOD ____

6-5

Study Guide and Intervention *(continued)*

Solving Open Sentences Involving Absolute Value

Absolute Value Inequalities When solving inequalities that involve absolute value, there are two cases to consider for inequalities involving $<$ (or $\leq$) and two cases to consider for inequalities involving $>$ (or $\geq$).

If $|x| < n$, then $x > -n$ and $x < n$.
If $|x| > n$, then $x > n$ or $x < -n$.

Remember that inequalities with *and* are related to intersections, while inequalities with *or* are related to unions.

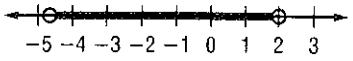
Example **Solve $|3a + 4| < 10$. Then graph the solution set.**

Write $|3a + 4| < 10$ as $3a + 4 < 10$ and $3a + 4 > -10$.

$3a + 4 < 10$	and	$3a + 4 > -10$
$3a + 4 - 4 < 10 - 4$		$3a + 4 - 4 > -10 - 4$
$3a < 6$		$3a > -14$
$\frac{3a}{3} < \frac{6}{3}$		$\frac{3a}{3} > \frac{-14}{3}$
$a < 2$		$a > -4\frac{2}{3}$

The solution set is $\left\{a \mid -4\frac{2}{3} < a < 2\right\}$.

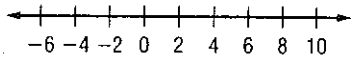
Now graph the solution set.



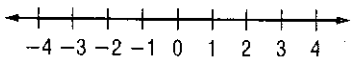
Exercises

Solve each open sentence. Then graph the solution set.

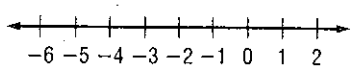
1. $|c - 2| > 6$



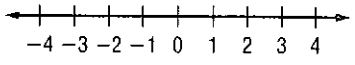
2. $|x - 3| < 0$



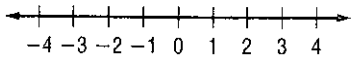
3. $|3f + 10| \leq 4$



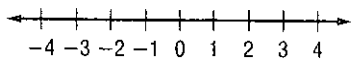
4. $|x| \leq 2$



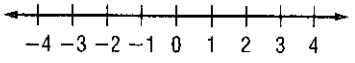
5. $|x| \geq 3$



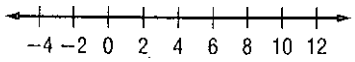
6. $|2x + 1| \geq -2$



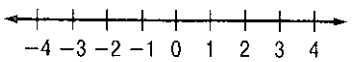
7. $|2d - 1| \leq 4$



8. $|3 - (x - 1)| \leq 8$

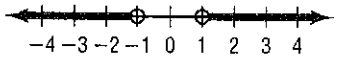


9. $|3r + 2| < -5$

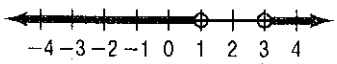


For each graph, write an open sentence involving absolute value.

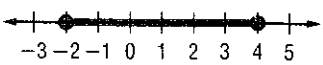
10.



11.



12.



NAME _____ DATE _____ PERIOD _____

6-6

Study Guide and Intervention

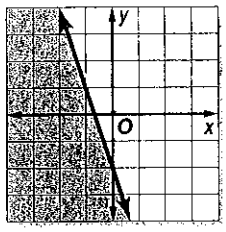
Graphing Inequalities in Two Variables

Graph Linear Inequalities The solution set of an inequality that involves two variables is graphed by graphing a related linear equation that forms a boundary of a **half-plane**. The graph of the ordered pairs that make up the solution set of the inequality fill a region of the coordinate plane on one side of the half-plane.

Example **Graph $y \leq -3x - 2$.**

Graph $y = -3x - 2$.

Since $y \leq -3x - 2$ is the same as $y < -3x - 2$ and $y = -3x - 2$, the boundary is included in the solution set and the graph should be drawn as a solid line.



Select a point in each half plane and test it. Choose (0, 0) and (−2, −2).

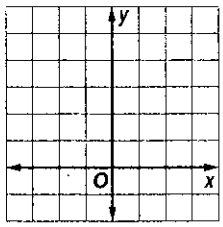
$y \leq -3x - 2$	$y \leq -3x - 2$
$0 \leq -3(0) - 2$	$-2 \leq -3(-2) - 2$
$0 \leq -2$ is false.	$-2 \leq 6 - 2$
	$-2 \leq 4$ is true.

The half-plane that contains (−2, −2) contains the solution. Shade that half-plane.

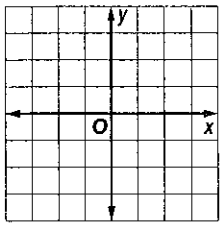
Exercises

Graph each inequality.

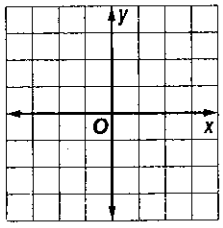
1. $y < 4$



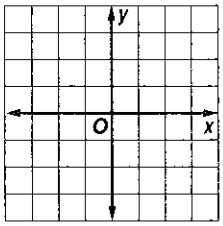
2. $x \geq 1$



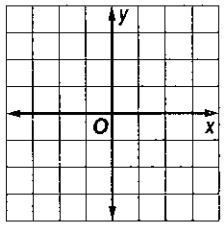
3. $3x \leq y$



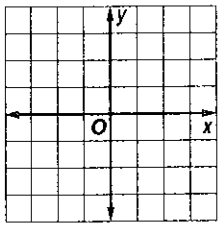
4. $-x > y$



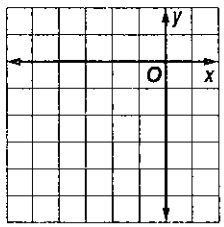
5. $x - y \geq 1$



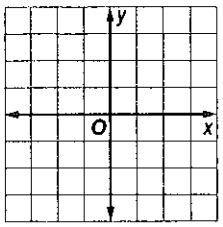
6. $2x - 3y \leq 6$



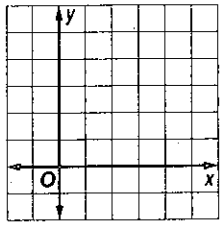
7. $y < -\frac{1}{2}x - 3$



8. $4x - 3y < 6$



9. $3x + 6y \geq 12$



NAME _____ DATE _____ PERIOD ____

6-6 Skills Practice

Graphing Inequalities in Two Variables

Determine which ordered pairs are part of the solution set for each inequality.

1. $y > 3x$, $\{(1, 5), (1, 0), (-1, 0), (5, 1)\}$

2. $y \geq x + 3$, $\{(2, -3), (-2, -1), (1, 6), (3, 4)\}$

3. $y < x - 1$, $\{(3, 1), (-2, -4), (4, -2), (-3, 3)\}$

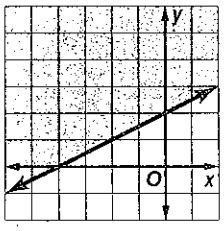
Match each inequality with its graph.

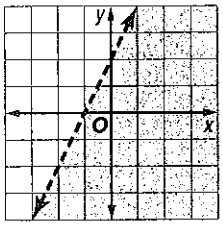
4. $y - 2x < 2$

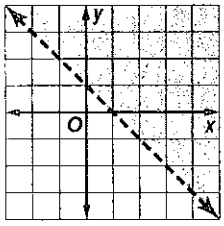
5. $y \leq -3x$

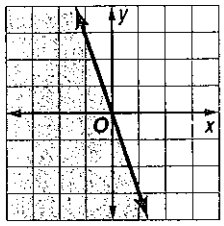
6. $2y - x \geq 4$

7. $x + y > 1$

a. 

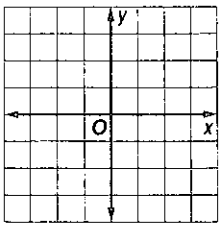
b. 

c. 

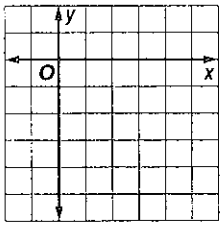
d. 

Graph each inequality.

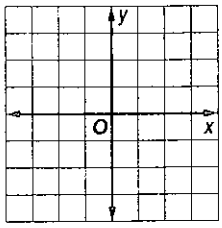
8. $y < -1$



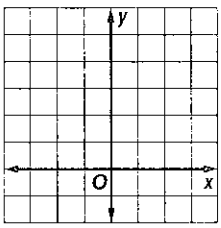
9. $y \geq x - 5$



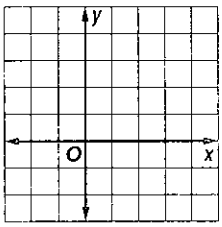
10. $y > 3x$



11. $y \leq 2x + 4$



12. $y + x > 3$



13. $y - x \geq 1$