

Study Guide and Intervention

Alg1 3.0

Solving Inequalities 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

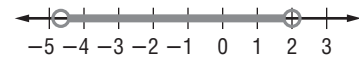
Solve $|3a + 4| < 10$. Then graph the solution set.

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 $\left\{a \mid -4\frac{2}{3} < a < 2\right\}$.

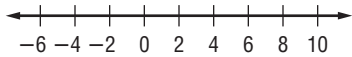
Now graph the solution set.



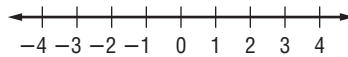
Exercises

Solve each open sentence. Then graph the solution set.

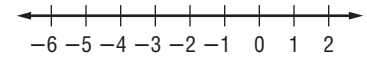
1. $|c - 2| > 6$



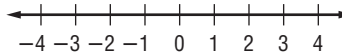
2. $|x - 3| < 0$



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



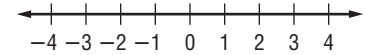
4. $|x| \leq 2$



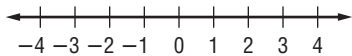
5. $|x| \geq 3$



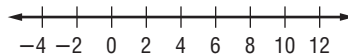
6. $|2x + 1| \geq -2$



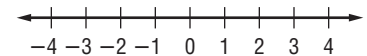
7. $|2d - 1| \leq 4$



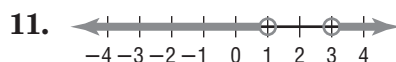
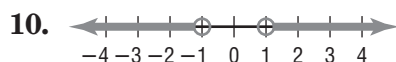
8. $|3 - (x - 1)| \leq 8$



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



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



Study Guide and Intervention *(continued)*

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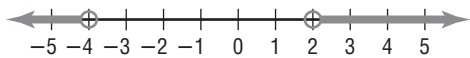
Remember that inequalities with *and* are related to intersections, while inequalities with *or* are related to unions.

Example 1 Solve $|2x + 3| > 5$. Then graph the solution set.

Write $|2x + 3| > 5$ as $2x + 3 > 5$ and $2x + 3 < -5$

$$\begin{array}{rcl} 2x + 3 > 5 & \text{or} & 2x + 3 < -5 \\ 2x + 3 - 3 > 5 - 3 & & 2x + 3 - 3 < -5 - 3 \\ 2x > 2 & & 2x < -8 \\ \frac{2x}{2} > \frac{2}{2} & & \frac{2x}{2} < \frac{-8}{2} \\ x > 1 & & x < -4 \end{array}$$

The solution set is $x < -4$ or $x > 1$.
 Now graph the solution set.



Example 2 Write an inequality involving absolute value from the graph.



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

The distance from -4 to -1 is 3 units.

The distance from 2 to -1 is 3 units.

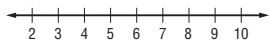
The solution set is $\{x \mid -4 < x < 2\}$.

So, $|x + 2| < 3$

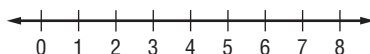
Exercises

Solve each open sentence. Then graph the solution set.

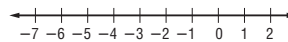
1. $|b - 6| > 3$



2. $|f - 4| < 1$



3. $|2m + 5| \geq 7$



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

