5-5 Study Guide and Intervention
Inequalities Involving Absolute Value

Inequalities Involving Absolute Value (<) When solving inequalities that involve absolute value, there are two cases to consider for inequalities involving < (or ≤).

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

Remember that inequalities with *and* are related to intersections.

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

$|3a+4| < 10$ and $|-(3a+4)| < 10$

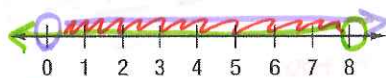$3a + 4 < 10$ $-3a - 4 < 10$
$3a < 6$ $-3a < 14$
$a < 2$ $a > -\frac{14}{3}$

Interval notation $\left(-\frac{14}{3}, 2\right)$

Exercises

Solve each inequality. Then graph the solution set.

2. $|x - 4| < 4$ and $|-(x-4)| < 4$

$x - 4 < 4$ $-x + 4 < 4$
$x < 8$ and $-x < 0$
                     $x > 0$

Interval notation: $(0, 8)$

3. $|y + 3| \leq 2$

$y + 3 \leq 2$ and $-(y+3) \leq 2$
$y \leq -1$ $-y - 3 \leq 2$
       and $-y \leq 5$
                     $y \geq -5$

Interval notation: $[-5, -1]$

4. $|b + 2| \leq 3$

$b + 2 \leq 3$ and $-(b+2) \leq 3$
$b \leq 1$ $-b - 2 \leq 3$
                     $-b \leq 5$
                     $b \geq -5$

Interval notation: $[-5, 1]$

6. $|t + 2| \leq 4$

$t + 2 \leq 4$ and $-(t+2) \leq 4$
$t \leq 2$ $-t - 2 \leq 4$
                     $-t \leq 6$
                     $t \geq -6$

Interval notation: $[-6, 2]$

5-5 Study Guide and Intervention (continued)
Inequalities Involving Absolute Value

Solve Absolute Value Inequalities (>) When solving inequalities that involve absolute value, there are two cases to consider for inequalities involving > (or ≥).
Remember that inequalities with *or* are related to unions.

Example: Solve $|2b + 9| > 5$. **Then graph the solution set.**

$2b + 9 > 5$ (or) $-(2b+9) > 5$

$2b > -4$ $\quad\quad\quad -2b - 9 > 5$

$b > -2$ $\quad\quad\quad\quad\quad -2b > 14$

$\quad\quad\quad\quad\quad\quad\quad\quad b < -7$

Interval notation: $(-\infty, -7) \cup (-2, \infty)$

Exercises

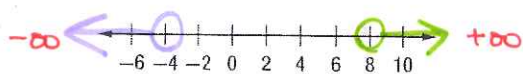**Solve each inequality. Then graph the solution set.**

1. $|c - 2| > 6$

$c - 2 > 6$ (or) $-(c-2) > 6$

$c > 8$ $\quad\quad\quad -c + 2 > 6$

$\quad\quad\quad\quad\quad -c > 4$

$\quad\quad\quad\quad\quad c < -4$

Interval notation: $(-\infty, -4) \cup (8, \infty)$

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

$3f + 10 \geq 4$ or $-(3f+10) \geq 4$

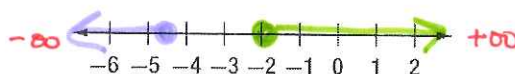$3f \geq -6$ $\quad\quad\quad -3f - 10 \geq 4$

$f \geq -2$ $\quad\quad\quad\quad -3f \geq 14$

$\quad\quad\quad\quad\quad\quad f \leq -\frac{14}{3}$ or $-4\frac{2}{3}$

Interval notation: $(-\infty, -\frac{14}{3}] \cup [-2, \infty)$

8. $|3 - (x - 1)| \geq 8$
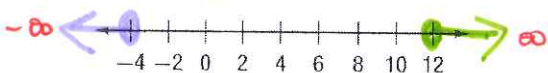
$|3 - x + 1| \geq 8$

$|4 - x| \geq 8$

$4 - x \geq 8$ or $-(4-x) \geq 8$

$-x \geq 4$ $\quad\quad\quad -4 + x \geq 8$

$x \leq -4$ $\quad\quad\quad\quad x \geq 12$

Interval notation $(-\infty, -4] \cup [12, \infty)$

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

$3r + 2 > -5$ or $-(3r+2) > -5$

$3r > -7$ $\quad\quad\quad -3r - 2 > -5$

$r > -\frac{7}{3}$ $\quad\quad\quad -3r > -3$

$\quad\quad\quad\quad\quad\quad r < 1$
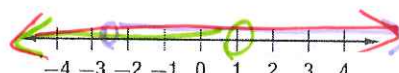
All real #'s work!

Interval notation: $(-\infty, \infty)$