

# Solving Inequalities Involving Absolute Value

(Pages 530–534)

For inequalities involving absolute value, there are two cases to consider.

<b>Solving Absolute Value Inequalities</b>	<b>Case 1</b> The value within the absolute value symbols is positive. <b>Case 2</b> The value within the absolute value symbols is negative.
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When solving an inequality involving absolute value and the symbols  $<$  or  $\leq$ , the solution can be written as an inequality using *and*. When solving an inequality involving absolute value and the symbols  $>$  or  $\geq$ , the solution can be written as an inequality using *or*.

## EXAMPLES

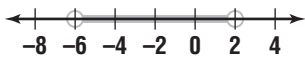
**Solve each inequality. Graph the solution.**

**A**  $|y + 2| < 4$

Note that in Case 2, you multiply each side by  $-1$  and reverse the symbol.

<b>Case 1</b>	<b>Case 2</b>
$y + 2 < 4$	$-(y + 2) < 4$
$y < 2$	$y + 2 > -4$
	$y > -6$

The solution is  $\{y | -6 < y < 2\}$ .

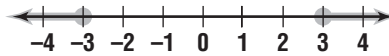


**B**  $|3p| \geq 9$

Note that in Case 2, you divide each side by  $-3$  and reverse the symbol.

<b>Case 1</b>	<b>Case 2</b>
$3p \geq 9$	$-3p \geq 9$
$p \geq 3$	$p \leq -3$

The solution is  $\{p | p \leq -3 \text{ or } p \geq 3\}$ .



## PRACTICE

**Solve each inequality. Graph the solution.**

1.  $|d + 4| \leq 7$

2.  $|7y| > 7$

3.  $|n - 3| \leq 4$

4.  $|w + 8| \geq 11$

5.  $|2g - 6| < 1$

6.  $|9k| < 36$

**Write an inequality involving absolute value for each statement. Do not solve.**

7. The weight  $w$  in a bicycle trailer must be within 40 pounds of 60 pounds, inclusive.

8. The height  $h$  of a person allowed on a roller coaster must be within 13 inches of 65 inches, inclusive.



**9. Standardized Test Practice** Solve  $|x - 5| \leq 7$ .

**A**  $\{x | x \leq 12 \text{ or } x \geq -2\}$

**B**  $\{x | -2 \leq x \leq 12\}$

**C**  $\{x | x \leq 12\}$

**D**  $\{x | x \geq -2\}$

**Answers: 1–6.** See Answer Key for graphs. 1.  $\{d | -11 \leq d \leq 3\}$  2.  $\{y | y > 1\}$  3.  $\{n | -1 \leq n \leq 7\}$  4.  $\{w | w \leq -19 \text{ or } w \geq 3\}$  5.  $\{g | 2.5 < g < 3.5\}$  6.  $\{k | -4 < k < 4\}$  7.  $|w - 60| \leq 40$  8.  $|h - 65| \leq 13$  9. B