

# 6.6

## Solve Absolute Value Inequalities

**Goal** • Solve absolute value inequalities.

**Your Notes**

### Example 1 Solve an absolute value inequality

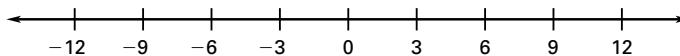
Solve the inequality. Graph your solution.

a.  $|x| \leq 9$

b.  $|x| > \frac{1}{4}$

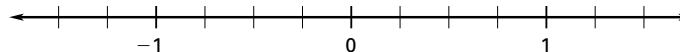
#### Solution

a. The distance between  $x$  and 0 is less than or equal to 9. So,  $\underline{\hspace{1cm}} \leq x \leq \underline{\hspace{1cm}}$ . The solutions are all real numbers  $\underline{\hspace{2cm}}$  and  $\underline{\hspace{2cm}}$ .



b. The distance between  $x$  and 0 is greater than  $\frac{1}{4}$ .

So,  $x > \underline{\hspace{1cm}}$  or  $x < \underline{\hspace{1cm}}$ . The solutions are all real numbers  $\underline{\hspace{2cm}}$  or  $\underline{\hspace{2cm}}$ .



Note that  $<$  can be replaced by  $\leq$  and  $>$  can be replaced by  $\geq$ .

#### SOLVING ABSOLUTE VALUE INEQUALITIES

- The inequality  $|ax + b| < c$  where  $c > 0$  is equivalent to the compound inequality  $\underline{\hspace{2cm}}$ .
- The inequality  $|ax + b| > c$  where  $c > 0$  is equivalent to the compound inequality  $\underline{\hspace{2cm}}$  or  $\underline{\hspace{2cm}}$ .

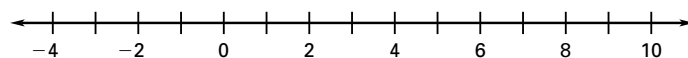
**Example 2** Solve an absolute value inequality

Solve  $|2x - 7| < 9$ . Graph your solution.

**Solution**

$ 2x - 7  < 9$	Write original inequality.
$\underline{\hspace{2cm}} < 2x - 7 < \underline{\hspace{2cm}}$	Rewrite as compound inequality.
$\underline{\hspace{2cm}}$	Add $\underline{\hspace{1cm}}$ to each expression.
$\underline{\hspace{2cm}}$	Divide each expression by $\underline{\hspace{1cm}}$ .

The solutions are all real numbers  $\underline{\hspace{2cm}}$  and  $\underline{\hspace{2cm}}$ . Check several solutions in the original inequality.



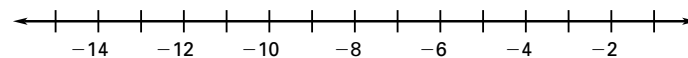
**Example 3** Solve an absolute value inequality

Solve  $|x + 8| - 4 \geq 2$ . Graph your solution.

**Solution**

$ x + 8  - 4 \geq 2$	Write original inequality.
$ x + 8  \geq \underline{\hspace{2cm}}$	Add $\underline{\hspace{1cm}}$ to each side.
$x + 8 \geq \underline{\hspace{2cm}}$ or $x + 8 \leq \underline{\hspace{2cm}}$	Rewrite as compound inequality.
$x \geq \underline{\hspace{2cm}}$ or $x \leq \underline{\hspace{2cm}}$	Subtract $\underline{\hspace{1cm}}$ from each side.

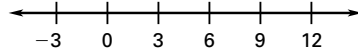
The solutions are all real numbers  $\underline{\hspace{2cm}}$  or  $\underline{\hspace{2cm}}$ .



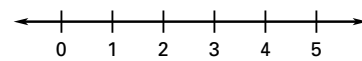
**Your Notes**

**✓ Checkpoint** Solve the inequality. Graph your solution.

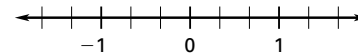
1.  $3|x - 6| > 9$



2.  $|6x - 11| \leq 7$



3.  $-2|6x - 1| + 5 < 3$



**SOLVING INEQUALITIES**

**One-Step and Multi-Step Inequalities**

- Follow the steps for solving an equation, but \_\_\_\_\_ the inequality symbol when \_\_\_\_\_.

**Compound Inequalities**

- If necessary, rewrite the inequality as two separate inequalities. Then solve each inequality separately. Include \_\_\_\_\_ or \_\_\_\_\_ in the solution.

**Absolute Value Inequalities**

- If necessary, isolate the absolute value expression on one side of the inequality. Rewrite the absolute value inequality as a \_\_\_\_\_. Then solve the compound inequality.

**Homework**