

# Lesson 4-6

## Absolute Value Equations and Inequalities

<p><b>Lesson Objectives</b></p> <p>1 Solve equations that involve absolute value</p> <p>2 Solve inequalities that involve absolute value</p>	<p><b>NAEP 2005 Strand:</b> Number Properties and Operations; Algebra</p> <p><b>Topics:</b> Number Sense; Equations and Inequalities</p> <p><b>Local Standards:</b> _____</p>
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### Key Concepts

**Solving Absolute Value Equations**  
 To solve an equation in the form  $|A| = b$ , where  $A$  represents a variable expression and  $b > 0$ , solve \_\_\_\_\_

**Solving Absolute Value Inequalities**  
 To solve an inequality in the form  $|A| < b$ , where  $A$  is a variable expression and  $b > 0$ , solve \_\_\_\_\_

To solve an inequality in the form  $|A| > b$ , where  $A$  is a variable expression and  $b > 0$ , solve \_\_\_\_\_

Similar rules are true for  $|A| \leq b$  and  $|A| \geq b$ .

### Example

1 **Solving an Absolute Value Equation** Solve and check  $|a| - 3 = 5$ .

$$|a| - 3 + \square = 5 + \square \quad \text{Add } \square \text{ to each side.}$$

$$|a| = \square \quad \text{Simplify.}$$

$$a = \square \text{ or } a = -\square \quad \text{Definition of absolute value.}$$

**Check**  $|a| - 3 = 5$

$$\left[ \square \right] - 3 \stackrel{?}{=} 5 \leftarrow \text{Substitute } \square \text{ and } \square \text{ for } a. \rightarrow \left[ \square \right] - 3 \stackrel{?}{=} 5$$

$$\square - 3 = 5 \checkmark \qquad \qquad \qquad \square - 3 = 5 \checkmark$$

### Quick Check

1. Solve each equation. Check your solutions.
- a.  $|t| - 2 = -1$  b.  $3|n| = 15$  c.  $4 = 3|w| - 2$
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**Examples**

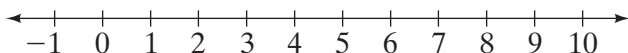
**2 Solving an Absolute Value Equation** Solve  $|3c - 6| = 9$ .

$$\begin{array}{l}
 3c - 6 = 9 \qquad \leftarrow \text{Write two equations.} \rightarrow \qquad 3c - 6 = -9 \\
 3c - 6 + \square = 9 + \square \quad \leftarrow \text{Add } \square \text{ to each side.} \rightarrow \quad 3c - 6 + \square = -9 + \square \\
 3c = \square \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad 3c = \square \\
 \frac{3c}{\square} = \frac{\square}{\square} \quad \leftarrow \text{Divide each side by } \square. \rightarrow \quad \frac{3c}{\square} = \frac{\square}{\square} \\
 c = \square \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad c = \square
 \end{array}$$

The value of  $c$  is  $\square$  or  $\square$ .

**3 Solving an Absolute Value Inequality** Solve  $|y - 5| \leq 2$ . Graph the solutions.

$$\begin{array}{l}
 y - 5 \geq -2 \qquad \text{and} \qquad y - 5 \leq 2 \qquad \text{Write a compound inequality.} \\
 y - 5 + \square \geq -2 + \square \quad \left| \quad y - 5 + \square \leq 2 + \square \quad \text{Add } \square \text{ to each side.} \\
 y \geq \square \qquad \qquad \qquad \text{and} \qquad y \leq \square \qquad \text{Simplify.} \\
 \square \leq y \leq \square
 \end{array}$$



**Quick Check**

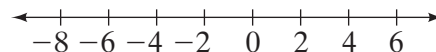
2. Solve each equation. Check your solutions.

a.  $|c - 2| = 6$

b.  $-5.5 = |t + 2|$

c.  $|7d| = 14$

3. Solve and graph  $|w + 2| > 5$ .



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