# Enrich

## Solving Absolute Value Equations

Consider the equation $|x| = 7$. To be a true statement, the value of $x$ must be a number that is 7 units from 0 on a number line. There are two possible solutions: $-7$ and $7$.

When more operations are involved you can use inverse operations to solve for $x$.

**Example 1**    Solve $|x| + 1 = 7$.

| | |
|---|---|
| $|x| + 1 = 7$ | Write the equation. |
| $\underline{\quad -1 \quad -1 \quad}$ | Subtract 1 from each side. |
| $|x| = 6$ | Simplify. |
| $x = -6 \text{ or } 6$ | **Think** What two numbers are 6 units from 0? |

**Example 2**    Solve $2|x| = 8$.

| | |
|---|---|
| $2|x| = 8$ | Write the equation. |
| $\dfrac{\quad}{\quad} \quad -$ | Divide each side by 2. |
| $|x| = 4$ | Simplify. |
| $x = -4 \text{ or } 4$ | **Think** What two numbers are 4 units from 0? |

**Exercises**

**Solve each absolute-value equation.**

**1.** $|a| + 3 = 14$         **2.** $|t| - 5 = 4$         **3.** $12 + |j| = 18$

**4.** $3|b| = 36$         **5.** $2|x| = 32$         **6.** $4|c| = 108$

**7.** $2|m| + 6 = 40$         **8.** $3|y| + 1 = 13$         **9.** $2|n| - 4 = 140$