Solve Linear Equations by Graphing **TEKS** *A.7.B*

GOAL Use graphs to solve linear equations.

In Chapter 3, you learned how to solve linear equations in one variable algebraically. You can also solve linear equations graphically.

KEY CONCEPT *For Your Notebook*

Steps for Solving Linear Equations Graphically

Use the following steps to solve a linear equation in one variable graphically.

STEP 1 **Write** the equation in the form $ax + b = 0$.

STEP 2 **Write** the related function $y = ax + b$.

STEP 3 **Graph** the equation $y = ax + b$.

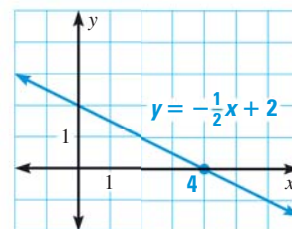The solution of $ax + b = 0$ is the x-intercept of the graph of $y = ax + b$.

EXAMPLE 1 **Solve an equation graphically**

Solve $\frac{5}{2}x + 2 = 3x$ **graphically. Check your solution algebraically.**

Solution

STEP 1 **Write** the equation in the form $ax + b = 0$.

$$\frac{5}{2}x + 2 = 3x \qquad \text{Write original equation.}$$

$$-\frac{1}{2}x + 2 = 0 \qquad \text{Subtract } 3x \text{ from each side.}$$

$y = -\frac{1}{2}x + 2$

STEP 2 **Write** the related function $y = -\frac{1}{2}x + 2$.

STEP 3 **Graph** the equation $y = -\frac{1}{2}x + 2$. The x-intercept is 4.

▶ The solution of $\frac{5}{2}x + 2 = 3x$ is 4.

CHECK Use substitution.

$$\frac{5}{2}x + 2 = 3x \qquad \text{Write original equation.}$$

$$\frac{5}{2}(4) + 2 \stackrel{?}{=} 3(4) \qquad \text{Substitute 4 for } x.$$

$$10 + 2 = 12 \qquad \text{Simplify.}$$

$$12 = 12 \checkmark \qquad \text{Solution checks.}$$