EXAMPLE 4 Solve a polynomial equation

Solve the equation $x^2 + 3x = 18$.

$x^2 + 3x = 18$ — Write original equation.

$x^2 + 3x - 18 = 0$ — Subtract 18 from each side.

$(x + 6)(x - 3) = 0$ — Factor left side.

$x + 6 = 0$ *or* $x - 3 = 0$ — Zero-product property

$x = -6$ *or* $x = 3$ — Solve for x.

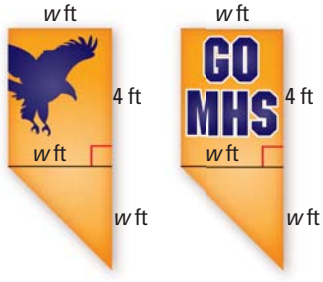
▶ The solutions of the equation are -6 and 3.

GUIDED PRACTICE for Example 4

8. Solve the equation $s^2 - 2s = 24$.

EXAMPLE 5 TAKS REASONING: Multi-Step Problem

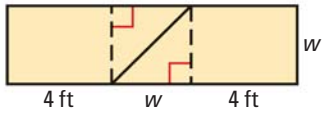
BANNER DIMENSIONS You are making banners to hang during school spirit week. Each banner requires 16.5 square feet of felt and will be cut as shown. Find the width of one banner.



ANOTHER WAY
For alternative methods for solving Example 5, turn to page 590 for the **Problem Solving Workshop**.

Solution

STEP 1 **Draw** a diagram of two banners together.



STEP 2 **Write** an equation using the fact that the area of 2 banners is $2(16.5) = 33$ square feet. Solve the equation for w.

$A = \ell \cdot w$ — Formula for area of a rectangle

$33 = (4 + w + 4) \cdot w$ — Substitute 33 for A and $(4 + w + 4)$ for ℓ.

$0 = w^2 + 8w - 33$ — Simplify and subtract 33 from each side.

$0 = (w + 11)(w - 3)$ — Factor right side.

$w + 11 = 0$ *or* $w - 3 = 0$ — Zero-product property

$w = -11$ *or* $w = 3$ — Solve for w.

▶ The banner cannot have a negative width, so the width is 3 feet.

GUIDED PRACTICE for Example 5

9. WHAT IF? In Example 5, suppose the area of a banner is to be 10 square feet. What is the width of one banner?