EXAMPLE 3 TAKS PRACTICE: Multiple Choice

UNDERSTAND ANSWER CHOICES
Sometimes a standardized test question may ask for the *solution set* of an equation. The answer choices will be given in the format $\{a, b\}$.

What are the roots of the equation $x^2 + 3x - 28 = 0$?

Ⓐ $-4, -7$ Ⓑ $4, -7$ Ⓒ $-4, 7$ Ⓓ $4, 7$

Solution

$x^2 + 3x - 28 = 0$ **Write original equation.**

$(x - 4)(x + 7) = 0$ **Factor.**

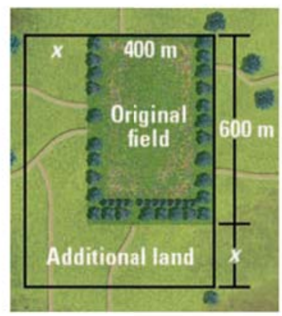
$x - 4 = 0$ or $x + 7 = 0$ **Zero product property**

$x = 4$ or $x = -7$ **Solve for *x*.**

▶ The correct answer is B. Ⓐ Ⓑ Ⓒ Ⓓ

EXAMPLE 4 Use a quadratic equation as a model

NATURE PRESERVE A town has a nature preserve with a rectangular field that measures 600 meters by 400 meters. The town wants to double the area of the field by adding land as shown. Find the new dimensions of the field.



Solution

New area (square meters) = New length (meters) • New width (meters)

$2(600)(400) = (600 + x) \cdot (400 + x)$

$480{,}000 = 240{,}000 + 1000x + x^2$ **Multiply using FOIL.**

$0 = x^2 + 1000x - 240{,}000$ **Write in standard form.**

$0 = (x - 200)(x + 1200)$ **Factor.**

$x - 200 = 0$ or $x + 1200 = 0$ **Zero product property**

$x = 200$ or $x = -1200$ **Solve for *x*.**

▶ Reject the negative value, -1200. The field's length and width should each be increased by 200 meters. The new dimensions are 800 meters by 600 meters.

✓ GUIDED PRACTICE for Examples 3 and 4

8. Solve the equation $x^2 - x - 42 = 0$.

9. **WHAT IF?** In Example 4, suppose the field initially measures 1000 meters by 300 meters. Find the new dimensions of the field.

ZEROS OF A FUNCTION In Lesson 4.2, you learned that the x-intercepts of the graph of $y = a(x - p)(x - q)$ are p and q. Because the function's value is zero when $x = p$ and when $x = q$, the numbers p and q are also called **zeros** of the function.