SOLVING QUADRATIC EQUATIONS As you saw in Lesson 4.3, if the left side of the quadratic equation $ax^2 + bx + c = 0$ can be factored, then the equation can be solved using the zero product property.

EXAMPLE 5 Solve quadratic equations

Solve (a) $3x^2 + 10x - 8 = 0$ and (b) $5p^2 - 16p + 15 = 4p - 5$.

a. $3x^2 + 10x - 8 = 0$ — Write original equation.

$(3x - 2)(x + 4) = 0$ — Factor.

$3x - 2 = 0$ or $x + 4 = 0$ — Zero product property

$x = \frac{2}{3}$ or $x = -4$ — Solve for x.

b. $5p^2 - 16p + 15 = 4p - 5$ — Write original equation.

$5p^2 - 20p + 20 = 0$ — Write in standard form.

$p^2 - 4p + 4 = 0$ — Divide each side by 5.

$(p - 2)^2 = 0$ — Factor.

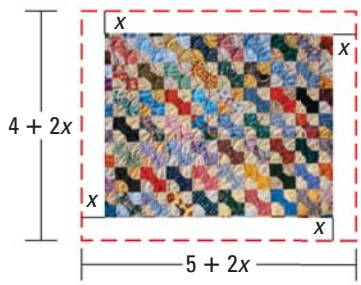
$p - 2 = 0$ — Zero product property

$p = 2$ — Solve for p.

INTERPRET EQUATIONS
If the square of an expression is zero, then the expression itself must be zero.

EXAMPLE 6 Use a quadratic equation as a model

QUILTS You have made a rectangular quilt that is 5 feet by 4 feet. You want to use the remaining 10 square feet of fabric to add a decorative border of uniform width to the quilt. What should the width of the quilt's border be?



Solution

Write a verbal model. Then write an equation.

Area of border (square feet)	=	Area of quilt and border (square feet)	−	Area of quilt (square feet)
↓		↓		↓
10	**=**	**$(5 + 2x)(4 + 2x)$**	**−**	**$(5)(4)$**

$10 = 20 + 18x + 4x^2 - 20$ — Multiply using FOIL.

$0 = 4x^2 + 18x - 10$ — Write in standard form.

$0 = 2x^2 + 9x - 5$ — Divide each side by 2.

$0 = (2x - 1)(x + 5)$ — Factor.

$2x - 1 = 0$ or $x + 5 = 0$ — Zero product property

$x = \frac{1}{2}$ or $x = -5$ — Solve for x.

▶ Reject the negative value, -5. The border's width should be $\frac{1}{2}$ ft, or 6 in.