NAME _____ DATE _____ PERIOD _____

9-3

Factoring Trinomials: $x^2 + bx + c$

(Pages 489—495)

The goal of factoring quadratic trinomials is the same as factoring monomials and polynomials using the distributive property, you want to write a multiplication problem consisting of factors of the trinomial. Sometimes a trinomial can be factored into the product of two binomials. This is essentially going from a trinomial to a FOIL problem. This process can be done through trial and error, however, that may be quite time consuming. So, it may be helpful to use the following rule to help limit your trials.

To factor a trinomial of the form $x^2 + bx + c$, find two numbers, m and n, where the sum $m + n = b$ and the product $mn = c$. Then write the trinomial $x^2 + bx + c$ as $(x + m)(x + n)$. Always use the FOIL method to check your answer. If your binomials are correct, then the product of your binomials should be the original trinomial.

Examples

a. Factor $x^2 + 10x + 21$.

$b = 10$ and $c = 21$

$m = 7, n = 3$	*Find an m and an n such that $m + n = 10$ and $mn = 21$.*
$(x + 7)(x + 3)$	*Write as $(x + m)(x + n)$.*

b. Solve the equation by factoring.

$x^2 + 5x + 4 = 0$

$m = 4$ and $n = 1$	*$m + n = 5, mn = 4$*
$(x + 4)(x + 1) = 0$	*$(x + m)(x + n) = 0$*
$x + 4 = 0$ or $x + 1 = 0$	*Zero Product*
$x = -4$ or $x = 0$	*Solve for x.*

Practice

Factor each trinomial.

1. $x^2 + 3x + 2$ **2.** $x^2 - x - 56$ **3.** $x^2 + 5x - 6$ **4.** $x^2 - 7x + 12$

Solve by factoring.

5. $x^2 + 12x + 20 = 0$ **6.** $x^2 - 5x - 24 = 0$ **7.** $x^2 - 18x + 80 = 0$ **8.** $x^2 + 7x - 44 = 0$

9. **Standardized Test Practice** The area of a rectangle is given by the quadratic trinomial equation $x^2 + 6x = 27$. Use factoring and the zero property to solve for x. HINT: In measurement only positive numbers are realistic answers.

$$A = lw$$
$$27 = x^2 + 6x$$
$$0 = x^2 + 6x - 27$$

A $x = 9$ units **B** $x = 6$ units **C** $x = 3$ units **D** $x = 1$ unit

Answers: **1.** $(x + 1)(x + 2)$ **2.** $(x + 7)(x - 8)$ **3.** $(x + 6)(x - 1)$ **4.** $(x - 4)(x - 3)$ **5.** $x = -2, -10$ **6.** $x = 8, -3$ **7.** $x = 8, 10$ **8.** $x = 4, -11$ **9.** C