NAME _____ DATE _____ PERIOD _____

8-7 Study Guide and Intervention

Solving $ax^2 + bx + c = 0$

Factor $ax^2 + bx + c$ To factor a trinomial of the form $ax^2 + bx + c$, find two integers, m and p whose product is equal to ac and whose sum is equal to b. If there are no integers that satisfy these requirements, the polynomial is called a **prime polynomial**.

Example 1 **Factor $2x^2 + 15x + 18$.**

In this example, $a = 2$, $b = 15$, and $c = 18$. You need to find two numbers that have a sum of 15 and a product of $2 \cdot 18$ or 36. Make a list of the factors of 36 and look for the pair of factors with a sum of 15.

Factors of 36	Sum of Factors
1, 36	37
2, 18	20
3, 12	15

Use the pattern $ax^2 + mx + px + c$, with $a = 2$, $m = 3$, $p = 12$, and $c = 18$.

$$\begin{aligned} 2x^2 + 15x + 18 &= 2x^2 + 3x + 12x + 18 \\ &= (2x^2 + 3x) + (12x + 18) \\ &= x(2x + 3) + 6(2x + 3) \\ &= (x + 6)(2x + 3) \end{aligned}$$

Therefore, $2x^2 + 15x + 18 = (x + 6)(2x + 3)$.

Example 2 **Factor $3x^2 - 3x - 18$.**

Note that the GCF of the terms $3x^2$, $3x$, and 18 is 3. First factor out this GCF.

$3x^2 - 3x - 18 = 3(x^2 - x - 6)$.

Now factor $x^2 - x - 6$. Since $a = 1$, find the two factors of -6 with a sum of -1.

Factors of -6	Sum of Factors
1, -6	-5
-1, 6	5
-2, 3	1
2, -3	-1

Now use the pattern $(x + m)(x + p)$ with $m = 2$ and $p = -3$.

$x^2 - x - 6 = (x + 2)(x - 3)$

The complete factorization is $3x^2 - 3x - 18 = 3(x + 2)(x - 3)$.

Lesson 8-7

Exercises

Factor each polynomial, if possible. If the polynomial cannot be factored using integers, write *prime*.

1. $2x^2 - 3x - 2$
2. $3m^2 - 8m - 3$
3. $16r^2 - 8r + 1$
4. $6x^2 + 5x - 6$
5. $3x^2 + 2x - 8$
6. $18x^2 - 27x - 5$
7. $2a^2 + 5a + 3$
8. $18y^2 + 9y - 5$
9. $-4t^2 + 19t - 21$
10. $8x^2 - 4x - 24$
11. $28p^2 + 60p - 25$
12. $48x^2 + 22x - 15$
13. $3y^2 - 6y - 24$
14. $4x^2 + 26x - 48$
15. $8m^2 - 44m + 48$
16. $6x^2 - 7x + 18$
17. $2a^2 - 14a + 18$
18. $18 + 11y + 2y^2$