Name _____ Date _____

LESSON 8.7

Study Guide

For use with the lesson "Factor Special Products"

GOAL **Factor special products.**

Vocabulary

The pattern for finding the square of a binomial gives you the pattern for factoring trinomials of the form $a^2 + 2ab + b^2$ and $a^2 - 2ab + b^2$. These are called **perfect square trinomials.**

EXAMPLE 1 Factor the difference of squares

Factor the polynomial.

a. $r^2 - 81 = r^2 - 9^2$ — Write as $a^2 - b^2$.

$= (r - 9)(r + 9)$ — Difference of two squares pattern

b. $9s^2 - 4t^2 = (3s)^2 - (2t)^2$ — Write as $a^2 - b^2$.

$= (3s - 2t)(3s + 2t)$ — Difference of two squares pattern

c. $80 - 125q^2 = 5(16 - 25q^2)$ — Factor out common factor.

$= 5[4^2 - (5q)^2]$ — Write $16 - 25q^2$ as $a^2 - b^2$.

$= 5(2 - 5q)(2 + 5q)$ — Difference of two squares pattern

Exercises for Example 1

Factor the polynomial.

1. $m^2 - 121$
2. $9n^2 - 64$
3. $3y^2 - 147z^2$

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Study Guide *continued*

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EXAMPLE 2 Factor perfect square trinomials

Factor the polynomial.

a. $x^2 + 14x + 49 = x^2 + 2(x)(7) + 7^2$ — Write as $a^2 + 2ab + b^2$.

$= (x + 7)^2$ — Perfect square trinomial pattern

b. $144y^2 - 120y + 25 = (12y)^2 - 2(12y)(5) + 5^2$ — Write as $a^2 - 2ab + b^2$.

$= (12y - 5)^2$ — Perfect square trinomial pattern

c. $150z^2 - 60z + 6 = 6(25z^2 - 10z + 1)$ — Factor out common factor.

$= 6[(5z)^2 - 2(5z)(1) + 1^2]$ — Write $25z^2 - 10z + 1$ as $a^2 - 2ab + b^2$.

$= 6(5z - 1)^2$ — Perfect square trinomial pattern

Exercises for Example 2

Factor the polynomial.

4. $m^2 - \frac{1}{2}m + \frac{1}{16}$ **5.** $16r^2 + 40rs + 25s^2$ **6.** $36x^2 - 36x + 9$

EXAMPLE 3 Solve a polynomial equation

Solve the equation $q^2 - 100 = 0$.

Solution

$q^2 - 100 = 0$ — Write original equation.

$q^2 - 10^2 = 0$ — Write left side as $a^2 - b^2$.

$(q + 10)(q - 10) = 0$ — Difference of two squares pattern

$q + 10 = 0$ *or* $q - 10 = 0$ — Zero-product property

$q = -10$ *or* $q = 10$ — Solve for q.

The roots of the equation are -10 and 10.

Exercises for Example 3

Solve the equation.

7. $r^2 - 10r + 25 = 0$ **8.** $16m^2 - 81 = 0$