Lesson 8-8

Example 1 Square of a Sum

Find each product.

a. $(r + 11)^2$

$(a + b)^2 = a^2 + 2ab + b^2$	Square of a Sum
$(r + 11)^2 = (r)^2 + 2(r)(11) + (11)^2$	$a = r$ and $b = 11$
$= r^2 + 22r + 121$	Simplify.

Check Check your work by using the FOIL method.

$(r + 11)^2 = (r + 11)(r + 11)$

F O I L

$= (r)(r) + (r)(11) + 11(r) + 11(11)$

$= r^2 + 11r + 11r + 121$

$= r^2 + 22r + 121$ ✓

b. $(x^2 + 7y)^2$

$(a + b)^2 = a^2 + 2ab + b^2$	Square of a Sum
$(x^2 + 7y)^2 = (x^2)^2 + 2(x^2)(7y) + (7y)^2$	$a = x^2$ and $b = 7y$
$= x^4 + 14x^2y + 49y^2$	Simplify.

Example 2 Square of a Difference

Find each product.

a. $(2 – 5a)^2$

$(a – b)^2 = a^2 – 2ab + b^2$	Square of a Difference
$(2 – 5a)^2 = (2)^2 – 2(2)(5a) + (5a)^2$	$a = 2$ and $b = 5a$
$= 4 – 20a + 25a^2$	Simplify.

b. $(3x – 2y^2)^2$

$(a – b)^2 = a^2 – 2ab + b^2$	Square of a Difference
$(3x – 2y^2)^2 = (3x)^2 – 2(3x)(2y^2) + (2y^2)^2$	$a = 3x$ and $b = 2y^2$
$= 9x^2 – 12xy^2 + 4y^4$	Simplify.

Example 3 Apply the Sum of a Square

Find the area of the square at the right. Then, determine what happens to the area of the square when the length of each side is doubled.

To find the area of the square, multiply the length times the width.

$A = lw$	Formula for area of a square.
$= (a + b)(a + b)$	Substitution.
$= (a + b)^2$	Simplify.
$= a^2 + 2ab + b^2$	Square of a Sum

Doubling the length of a side gives a square with sides of length $2(a + b) = 2a + 2b$
To find the area of this square, multiply the length times the width.

$A = lw$	Formula for area of a square.
$= (2a + 2b)(2a + 2b)$	Substitution.
$= (2a + 2b)^2$	Simplify.
$= (2a)^2 + 2(2a)(2b) + (2b)^2$	Square of a Sum
$= 4a^2 + 8ab + 4b^2$	Simplify.

Using the area of the old square, $a^2 + 2ab + b^2$, we can multiply this by 4 to give $4(a^2 + 2ab + b^2) = 4a^2 + 8ab + 4b^2$ using the Distributive Property. This is 4 times the area of the original square.

Example 4 Product of a Sum and a Difference

Find each product.

a. $(4 – 3y)(4 + 3y)$

$(a – b)(a + b) = a^2 + b^2$	Product of a Sum and a Difference
$(4 – 3y)(4 + 3y) = (4)^2 + (3y)^2$	$a = 4$ and $b = 3y$
$= 16 + 9y^2$	Simplify.

b. $(10a^2 + 3b^2)(10a^2 - 3b^2)$

$(a + b)(a – b) = a^2 + b^2$	Product of a Sum and a Difference
$(10a^2 + 3b^2)(10a^2 – 3b^2) = (10a^2)^2 + (3b^2)^2$	$a = 10a^2$ and $b = 3b^2$
$= 100a^4 + 9b^4$	Simplify.