Name _____ Date _____

7.3 Notetaking with Vocabulary

I can multiply polynomials using special patterns (square of a binomial/square-double-square and sum and difference/difference of two squares).

FOIL the following $(a+b)^2$ $= (a+b)(a+b) = a^2 + ab + ab + b^2$

$= a^2 + 2ab + b^2$

$(a-b)^2$

FOIL the following $(x-4)^2$

$(x-4)(x-4)$

$= x^2 - 4x - 4x + 16$

$= x^2 - 8x + 16$

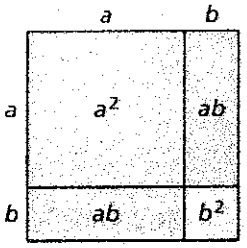
	a	$-b$
a	a^2	$-ab$
$-b$	$-ab$	b^2

$= a^2 - 2ab + b^2$

Using the Square of a Binomial Pattern

The diagram shows a square with a side length of $(a + b)$ units. You can see that the area of the square is

$$(a + b)^2 = a^2 + 2ab + b^2.$$



This is one version of a pattern called the square of a binomial. To find another version of this pattern, use algebra: replace b with $-b$.

$(a + (-b))^2 = a^2 + 2a(-b) + (-b)^2$ Replace b with $-b$ in the pattern above.

$(a - b)^2 = a^2 - 2ab + b^2$ Simplify.

Square of a Binomial (Difference of Two Squares) Pattern

Algebra	Example
$(a + b)^2 = a^2 + 2ab + b^2$	$(x + 5)^2 = (x)^2 + 2(x)(5) + (5)^2$ $= x^2 + 10x + 25$
$(a - b)^2 = a^2 - 2ab + b^2$	$(2x - 3)^2 = (2x)^2 - 2(2x)(3) + (3)^2$ $= 4x^2 - 12x + 9$

In Exercises 1 – 4, find the product. square-double-square

1. $(a + 3)^2$

$(a)^2 + 2(3a) + 3^2$

$a^2 + 6a + 9$

2. $(3x - 2)^2$ $3x \cdot (-2) = -6x$

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

$9x^2 - 12x + 4$

3. $(-2x + 1)^2$

4. $(3x + 2y)^2$

Sum and Difference Pattern / Difference of 2 squares

Algebra	Example
$(a \oplus b)(a \ominus b) = a^2 - b^2$	$(x + 3)(x - 3) = x^2 - 9$

Why? Try FOILing $(x - 2)(x + 2)$

$= x^2 + 2x - 2x - 4$

$= x^2 - 4$

5. $(x \ominus 3)(x \oplus 3)$

$x^2 - (3)^2$

$x^2 - 9$

6. $(5a - 1)(5a + 1)$

$(5a)^2 - (1)^2$

$25a^2 - 1$

7. $\left(\frac{1}{4}b + 1\right)\left(\frac{1}{4}b - 1\right)$

8. $(-m \oplus 2n)(-m \ominus 2n)$

$(-m)^2 - (2n)^2$

$m^2 - 4n^2$

9. $\left(\frac{1}{4}b + 1\right)\left(\frac{1}{4}b - 1\right)$

10. $\left(6a + \frac{1}{2}b\right)\left(-6a + \frac{1}{2}b\right)$

square double square

11. Find k so that $kx^2 - 12x + 9$ is the square of a binomial. $(2x-3)^2$

$\sqrt{9} = 3$

$2x \cdot 2x = 4x^2$

$-12 = 2 \cdot (-6)$

product

$-6x = -3 \cdot ?$

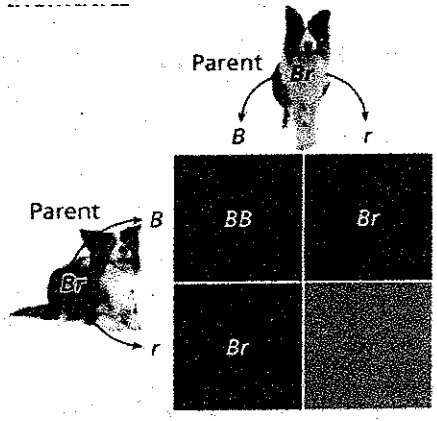
$? = 2x$

$k = 4$

Mathematical Modeling with the sum and difference (difference of two squares) pattern.

A combination of two genes determines the color of the dark patches of a border collie's coat. An offspring inherits one patch color gene from each parent. Each parent has two color genes, and the offspring has an equal chance of inheriting either one.

The gene B is for black patches, and the gene r is for red patches. Any gene combination with a B results in black patches. Suppose each parent has the same gene combination Br. The Punnett square shows the possible gene combinations of the offspring and the resulting patch colors.



12. a. What percent of the possible gene combinations result in black patches?

75% of the combinations result in black patches.

b. Show how you could use a polynomial to model the possible gene combinations.

$(.5B + .5r)(.5B + .5r)$

	.5B	.5r
.5B	.25BB	.25Br
.5r	.25Br	.25rr

$= .25BB + .5Br + .25rr$