Name: _____ Date: _____

MULTIPLYING MONOMIALS AND BINOMIALS
ALGEBRA 2 WITH TRIGONOMETRY

It is essential to have a firm grasp of basic quadratic algebra, including the properties of exponents. Although these skills will be reinforced in many future lessons, this lesson will serve to review essential skills that students learned in introductory algebra. We will begin by reviewing how to multiply monomial terms.

***Exercise* #1:** Find each of the following products.

(a) $3x^2 \cdot 5x^3$ (b) $-2x \cdot 7x^3$ (c) $-5x^2y^4 \cdot -3xy^3$ (d) $(4x)^2$

Although the skills in *Exercise* #1 are vital, it is important to be able to use them in conjunction with the **distributive property** in order to multiply polynomials by monomials.

***Exercise* #2:** Use the distributive property and exponent laws to rewrite each of the following products without parentheses.

(a) $5(2x+8)$ (b) $3x(4x-7)$ (c) $x(x-3)$ (d) $-2x(3x-4)$

One final skill that needs to be reviewed in this lesson is the process of multiplying two **binomials** together. This skill occurs so often in mathematics that the acronym FOIL (for First-Outer-Inner-Last) is commonly used to remind us that four products must occur whenever two binomials are multiplied.

***Exercise* #3:** Write each of the following products in simplest ax^2+bx+c form.

(a) $(x+5)(x+8)$ (b) $(3x+2)(x-4)$ (c) $(2x-1)(3x-2)$ (d) $(3x-7)(x+2)$

***Exercise* #4:** Which of the following is equivalent to $(4x-3)^2$?

(1) $8x^2-6$ (3) $16x^2+9$

(2) $16x^2-24x-9$ (4) $16x^2-24x+9$

In this course, binomials that have the form $(x+a)$ and $(x-a)$ will commonly arise. Due to the frequency of these pairings, any two binomials of this form are referred to as **conjugates**. The products of conjugates also have a special form which will be illustrated in the next exercise.

***Exercise* #4:** Find each of the following products in simplest form.

(a) $(x+5)(x-5)$ (b) $(3x+2)(3x-2)$ (c) $(2x-1)(2x+1)$ (d) $(x-y)(x+y)$

***Exercise* #5:** The product of the binomial $(x+a)$ with its conjugate will always equal

(1) x^2+a^2 (3) x^2-a

(2) x^2-a^2 (4) $x-a$ _____

For problems that occur later in this course, it will be important to be able to recognize the conjugate and find its product with the original binomial quickly.

***Exercise* #6:** *Without* using a formal distributive process, find each of the following products.

(a) $(x-4)(x+4)$ (b) $(x+7)(x-7)$ (c) $(4x+3)(4x-3)$ (d) $(2x-5)(2x+5)$

***Exercise* #7:** Which of the following represents the product of the binomial $(5x-3)$ with its conjugate?

(1) $25x-9$ (3) $25x^2-9$

(2) $5x^2-9$ (4) $25x^2-30x+9$ _____

***Exercise* #8:** The binomial x^2-36 is the result of which of the following products?

(1) $(x-4)(x+9)$ (3) $(x-4)(x-9)$

(2) $(x-6)(x-6)$ (4) $(x-6)(x+6)$ _____

***Exercise* #9:** Find the following product in simplest terms.

$$(x-2)(x+2)(x-5)(x+5)$$

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MULTIPLYING MONOMIALS AND BINOMIALS
ALGEBRA 2 WITH TRIGONOMETRY - HOMEWORK

SKILLS

1. Find each of the following products.

   (a) $3x^5 \cdot 8x^2$ (b) $-2x^2 \cdot -3x^4$ (c) $5x^2y^3 \cdot 2xy^6$ (d) $-4xy \cdot 3x^2$

2. Which of the following is equivalent to $\left(-2x^3y^5\right)^2$?

   (1) $-4x^9y^{25}$ (3) $4x^9y^{25}$

   (2) $-2x^6y^{10}$ (4) $4x^6y^{10}$ _____

3. Rewrite each of the following products without parentheses.

   (a) $2(4x-5)$ (b) $5x(3x-2)$ (c) $x(2x+9)$ (d) $-3x\left(x^2-9x\right)$

4. Rewrite each of the following products in simplest ax^2+bx+c form.

   (a) $(x+8)(x-3)$ (b) $(4x-9)(2x-5)$ (c) $(2x+7)(4x-1)$ (d) $(x+9)(x+3)$

   (e) $(3x+2)(2x+3)$ (f) $(7x+4)(5x-2)$ (g) $(4x-3)(x-9)$ (h) $(3x+1)(10x-7)$

5. Rewrite each of the following products in simplest ax^2+bx+c form. Please note that we are not multiplying conjugates in this problem.

   (a) $(x+5)^2$ (f) $(x-7)^2$ (g) $(4x-11)^2$ (h) $(4x+3)^2$

6. Multiply each of the following pairs of conjugates using the fact that $(x-a)(x+a)=x^2-a^2$.

(a) $(x+8)(x-8)$ (b) $(x-9)(x+9)$ (c) $(2x+7)(2x-7)$ (d) $(3x+1)(3x-1)$

(e) $(x+10)(x-10)$ (f) $(5x+2)(5x-2)$ (g) $(4x+y)(4x-y)$ (h) $(3x-2y)(3x+2y)$

7. When the binomial $5x-8$ is multiplied by its conjugate, the result is which of the following?

(1) $25x^2-64$ (3) $5x^2-8$

(2) $25x^2+64$ (4) $25x^2-80x+64$ _____

8. The product of $(x-8)$ with which of the following binomials would produce the trinomial $x^2-6x-16$?

(1) $x-4$ (3) $x-2$

(2) $x+4$ (4) $x+2$ _____

9. The product of $(3x-5)$ with which of the following binomials would produce the trinomial $6x^2-x-15$?

(1) $x+3$ (3) $2x+3$

(2) $2x-3$ (4) $x-3$ _____

APPLICATIONS

10. A rectangle is formed by increasing one dimension of a square by 3 units while decreasing the other also by 3 units. If the original side length of the square is represented by *x*, which of the following represents the area of the newly formed rectangle?

(1) $4x-9$ (3) x^2-9

(2) x^2-12 (4) $4x+12$ _____

11. The cost *per bike* for producing *x*-bicycles is given by the linear function $C=200-\frac{1}{10}x$. If the total cost, *T*, of producing *x*-bicycles is given by the product $T=x\cdot C$, then which of the following is a formula for *T*?

(1) $T=200x-\frac{1}{10}x^2$ (3) $T=200-\frac{1}{10}x^2$

(2) $T=200+\frac{9}{10}x$ (4) $T=199\frac{9}{10}x$ _____