Name: _____ Date: _____

MULTIPLYING POLYNOMIALS
COMMON CORE ALGEBRA I

Polynomials, as we saw in the last lesson, behave a lot like integers (whole numbers including the negatives). We saw that just like integers, **adding one polynomial to another polynomial results in a third polynomial**. The same will occur with multiplying them. First, a review problem.

***Exercise* #1: Monomials** are the simplest of **polynomials**. They consists of one **term** (terms are separated by addition and subtraction). Find the following products of monomials.

(a) $5x^3 \cdot 2x^2$ (b) $-3x \cdot -8x$ (c) $\frac{1}{2}x^2y^5 \cdot \frac{3}{4}x^9y$

We have also used the **Distributive Property** in previous lessons to multiply polynomials that are more complicated.

***Exercise* #2:** Find each of the following products in simplest form by using the distributive property once or twice.

(a) $2x(3x-1)$ (b) $x^2(4x^2+3)$ (c) $-2x^2y^3(2xy-5x)$

(d) $(x+2)(x-6)$ (e) $(2x+7)(x+3)$ (f) $(3x-2)(5x-1)$

Never forget that as we do these manipulations we are using **properties of equality** to produce **equivalent expressions**.

***Exercise* #3:** Consider the product of the two **binomial polynomials** $(x-1)(x-3)$.

(a) Find this product and express it as a **trinomial polynomial** written in standard form. Fill in the result in the first row (third column) of table (b).

(b) Fill out the table below using **TABLES** on your calculator to show they are equivalent.

x	$(x-1)(x-3)$	
0		
1		
2		
3		
4		

We can evaluate more complicated products, just as we have done in the past with normal numbers. The key will always be the careful use of the **distributive property**.

***Exercise* #4:** Find each of the following more challenging products.

(a) $(2x+5)^2$

(b) $(x+2)(x^2+4x+3)$

(c) $(x-4)(x+3)(x-5)$

(d) $(3x+2)^3$

***Exercise* #5:** Consider the product $(3x+2)(2x+1)$.

(a) Write this product as an equivalent trinomial expression in standard form.

(b) How can you use your answer from (a) to evaluate the product $(32)(21)$? Find the product and check using your calculator.

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MULTIPLYING POLYNOMIALS
COMMON CORE ALGEBRA I HOMEWORK

FLUENCY

1. Write the following products as polynomials in either *x* or *t*. The first is done as an example for you.

(a) $5x(2x-4)$

$=(5x)(2x)-(5x)(4)$

$=(5\cdot 2)(x\cdot x)-(5\cdot 4)(x)$

$=10x^2-20x$

(b) $3t(t+7)$

(c) $-4x(5x+1)$

(d) $4(t^2-5t+2)$

(e) $x(x^2-2x-3)$

(f) $-5t(2t^2+3t-7)$

2. Perhaps the most important type of polynomial multiplication is that of two binomials. Make sure you are **fluent** with this skill. Write each of the following **products** as an **equivalent polynomial** written in **standard form**. The first problem is done as an example using **repeated distribution**.

(a) $(x+5)(x-3)$

$=(x+5)(x)+(x+5)(-3)$

$=(x)(x)+(5)(x)+(x)(-3)+(-5)(3)$

$=x^2+5x-3x-15$

$=x^2+2x-15$

(b) $(x-10)(x-4)$

(c) $(x+3)(x+12)$

(d) $(2x+3)(5x+8)$

(e) $(4x-1)(x+2)$

(f) $(6x-5)(4x-3)$

3. Never forget that squaring a binomial also a process of repeated distribution. Write each of the following perfect squares as **trinomials** in **standard form**.

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

(b) $(x-10)^2$

(c) $(2t+3)^2$

4. An interesting thing happens when you multiply two **conjugate binomials**. Conjugates have the property of having the same **terms** but differ by the operation between the two terms (in one case addition and in one case subtraction). Multiply each of the following **conjugate pairs** and state your answers in **standard form**. The first is done as an example

(a) $(x+3)(x-3)$ (b) $(x-5)(x+5)$ (c) $(10+x)(10-x)$

$= x(x-3)+3(x-3)$

$= x^2-3x+3x-9$

$= x^2-9$

(d) $(2t+3)(2t-3)$ (e) $(5t+1)(5t-1)$ (f) $(8-3t)(8+3t)$

5. Write each of the following products in standard polynomial form.

(a) $(x+3)(x-2)(x-8)$ (b) $(x+2)(x-2)(x+3)(x-3)$ (Hint: try to use #4)

REASONING

6. Notice again how similar polynomials are to integers, i.e. the set $\{...-3,-2,-1,0,1,2,3...\}$. Write a statement below for polynomials based on the statement about integers.

Statement About Integers: An integer times an integer produces an integer.

Statement About Polynomials: _____

_____

7. Consider the product $(3x+1)^2$.

(a) Write this product in standard trinomial form.

(b) Use your answer in part (a) to determine the value of 31^2 without your calculator.