Name: ______________________________ Date: ________________

MULTIPLYING POLYNOMIALS
COMMON CORE ALGEBRA II

Polynomials are expressions that are mainly combinations of terms with both addition and subtraction that can have only constants and positive integer powers. They are truly just an extension of our base-10 number system.

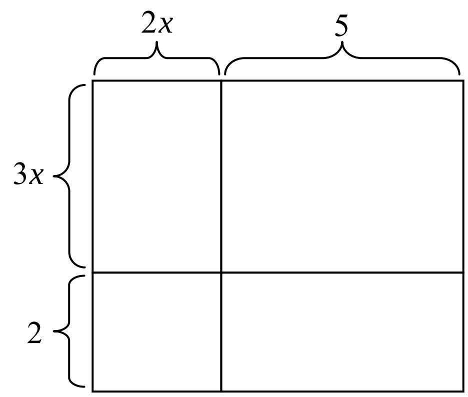
***Exercise* #1:** Given the polynomial $2x^3+5x^2+3x+4$, what is its value when $x=10$? How can you determine this without the use of your calculator? If you cannot, use your calculator to help and then explain why the answer turns out as it does.

We've already reviewed how to multiply polynomials by monomials in the last lesson. In this lesson we will look at multiplying polynomials by themselves. The key here is the distributive property. Let's start by looking at the product of **binomials**.

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

(a) Find this product using the distributive property twice (or possibly "foiling.")

(b) Represent this product on the area model shown below.



***Exercise* #3:** Find the product of the binomial $(4x+3)$ with the trinomial $(2x^2-5x-3)$. Represent your product using an area array. Even though the result has an x^3 term, the area array can still help us keep track of the product to make sure we are distributing correctly.

It is critical to understand that when we multiply two polynomials then our result is equivalent to this product and this equivalence can be tested.

***Exercise* #4:** Consider the product of $(x-2)$ and $(2x-5)$.

(a) Evaluate this product for $x=4$. Show the work that leads to your result.

(b) Find a trinomial that represents the product of these two binomials.

(c) Evaluate the trinomial for $x=4$. Is it equivalent to the answer you found in (a)?

(d) What is the value of the trinomial when $x=2$? Can you explain why this makes sense based on the two binomials?

***Exercise* #5:** The product of three binomials, just like the product of two, can be found with repeated applications of the distributive property.

(a) Find the product: $(x-2)(x+4)(x-7)$. Use area arrays to help keep track of the product.

(b) For what three values of *x* will the **cubic polynomial** that you found in part (a) have a value of zero? What famous law is this known as?

(c) Test one of the three values you found in (b) to verify that it is a **zero** of the **cubic polynomial**.

Name: ___________________________________ Date: _________________

MULTIPLYING POLYNOMIALS
COMMON CORE ALGEBRA II HOMEWORK

FLUENCY

1. Multiply the following binomials and express each product as an equivalent trinomial. Use an area model to help find your product, if necessary.

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

(d) $(x^2-4)(x^2+10)$ (e) $(2x^3+1)(5x^3+4)$ (f) $(x^2-1)(x^2-9)$

2. Find each of the following products in equivalent form. Use an array model to help find your final answers if you find it helpful.

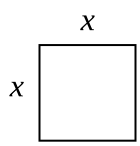
(a) $(x+5)(x^2+3x+2)$ (b) $(2x-3)(4x^2+5x-7)$

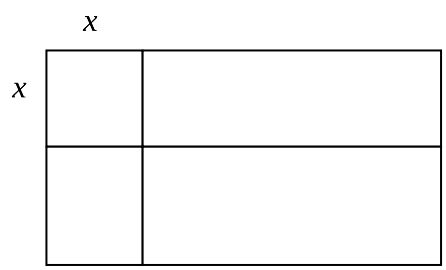
(c) $(2x+5)^3$

APPLICATIONS

3. A square of an unknown side length x inches has one side length increased by 4 inches and the other increased by 7 inches.

   (a) If the original square is shown below with side lengths marked as x, label the second diagram to represent the new rectangle constructed by increasing the sides as described above.





   (b) Label each portion of the second diagram with their areas in terms of x (when applicable). State the product of $(x+4)$ and $(x+7)$ as a trinomial below.

   (c) If the original square had a side length of $x=2$ inches, then what is the area of the second rectangle? Show how you arrived at your answer.

   (d) Verify that the trinomial you found in part (b) has the same value as (c) for $x=2$.

REASONING

4. Think about the expression $(x-8)(x+4)$.

   (a) For what values of x will this expression be equal to zero? Show how you arrived at your answer.

   (b) Write this product as an equivalent trinomial.

   (c) Show that this trinomial is also equal to zero at the larger value of x from part (a).