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Name: KEY Date: _____

MULTIPLYING POLYNOMIALS

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) $5x^3 \cdot 2x^2$

$10x^5$

(b) $-3x \cdot -8x$

$24x^2$

(c) $\frac{1}{2}x^2y^5 \cdot \frac{3}{4}x^9y$ $\frac{3}{8}x^{11}y^6$

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) $2x(3x-1)$

$6x^2-2x$

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

$4x^4+3x^2$

(c) $-2x^3y^3(2xy-5x)$

$-4x^3y^4+10x^3y^3$

(d) $(x+2)(x-6)$

$x^2-6x+2x-12$

$x^2-4x-12$

(e) $(2x+7)(x+3)$

$2x^2+6x+7x+21$

$2x^2+13x+21$

(f) $(3x-2)(5x-1)$

$15x^2-3x-10x+2$

$15x^2-13x+2$

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).

$(x-1)(x-3)$

$x^2-3x-x+3$

x^2-4x+3

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

x	$(x-1)(x-3)$	x^2-4x+3	
0	$-1 \cdot -3 = 3$	3	✓
1	$0 \cdot -2 = 0$	$1-4+3=0$	✓
2	$1 \cdot -1 = -1$	$4-8+3=-1$	✓
3	$2 \cdot 0 = 0$	$9-12+3=0$	✓
4	$3 \cdot 1 = 3$	$16-16+3=3$	✓

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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) $(2x+5)^2$

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

$4x^2+10x+10x+25$

$4x^2+20x+25$

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

$x^3+4x^2+3x+2x^2+8x+6$

$x^3+6x^2+11x+6$

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

$(x^2+3x-4x-12)(x-5)$

$(x^2-x-12)(x-5)$

$x^3-5x^2-x^2+5x-12x+60$

$x^3-6x^2-7x+60$

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

$(3x+2)(9x^2+6x+6x+4)$

$(3x+2)(9x^2+12x+4)$

$27x^3+36x^2+12x+18x^2+24x+8$

$27x^3+54x^2+36x+8$

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

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

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

$6x^2+3x+4x+2$

$6x^2+7x+2$

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

$(32)(21)$

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