HW Last Night

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

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

(b) $4 - x - 5x^2$

(c) $x^3 + x - 7x^2 + 2$

(d) $2x + 1 - 3x^3 + 5x^2$

$-3x^3 + 5x^2 + 2x^1 + 1$

(e) $4x^3 - 2x^2 + 6 - 8x$

(f) $y^5 + y^{10} - y^2 + y^7$

6. Find each of the following sums and differences. Write your answer in simplest standard form.

✓ (a) $6x^2 - 2x + 8 + 3x^2 + 7x - 2$

$9x^2 + 5x + 6$

(b) $x^3 + 4x^2 - 8x + 3 + x^3 - x + 1$

(c) $(5x^2 + 3x - 1) - (3x^2 - 6x + 4)$

$5x^2 + 3x - 1 - 3x^2 + 6x - 4$

(d) $(2x^3 - 5x^2 + 8x - 1) - (-4x^3 + 8x^2 - 3x - 9)$
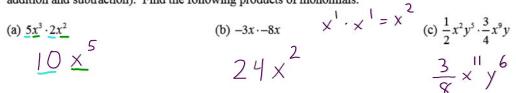
(e) $4x^2 + 6x - 3 - 3x^2 + 2x + 4$

(f) $(4x^2 + 6x - 3) - (3x^2 + 2x + 4)$

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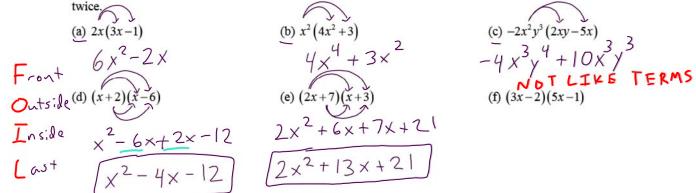
MULTIPLYING POLYNOMIALS!

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

$10x^5$ $24x^2$ $\frac{3}{8}x^{11}y^6$

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

$6x^2-2x$ $4x^4+3x^2$ $-4x^3y^4+10x^3y^3$

NOT LIKE TERMS

Front
Outside (d) $(x+2)(x-6)$ (e) $(2x+7)(x+3)$ (f) $(3x-2)(5x-1)$
Inside
Last $x^2-6x+2x-12$ $2x^2+6x+7x+21$

$\boxed{x^2-4x-12}$ $\boxed{2x^2+13x+21}$

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.

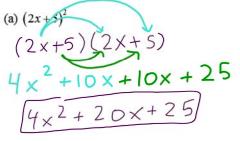| x	$(x-1)(x-3)$	
0		
1		
2		
3		
4		

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**.
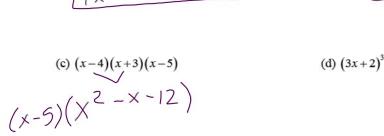
$$① \ x \ (x^2 + 4x + 3)$$

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

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

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

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

$\boxed{4x^2 + 20x + 25}$

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

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

$\boxed{x^3 + 6x^2 + 11x + 6}$

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

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

(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.

Name: _____   Date: _____

MULTIPLYING POLYNOMIALS
HOMEWORK

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

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

   $=(5x)(2x)-(5x)(4)$
   $=(5\cdot2)(x\cdot x)-(5\cdot4)(x)$
   $=10x^2-20x$

   (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) $(x+5)(x-3)$ (b) $(x-10)(x-4)$ (c) $(x+3)(x+12)$

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

   (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) $(x+2)(x-2)(x+3)(x-3)$ CHALLENGE!