# Bellwork

Multiply each of the following expressions:

1. $x^{-4}x^{8}x^{-1}$

$x^{-4+8+(-1)} = x^{3}$

2. $x^{5}x^{-2}$

$x^{5+(-2)} = x^{3}$

3. $-6x^{2}(7x)$

$-6(7)x^{2+1} = -42x^{3}$

# Recalling Polynomial Names

Monomial -

An expression that contains only one term.

For example, x or y

Binomial -

An expression that contains two terms that are separated by a + or - sign.

For example, $(x + 2)$ or $(y - 6)$

Trinomial -

An expression that contains three terms that are separated by a + or - sign.

For example, $(x^2 + 5x - 2)$ or $(y^6 - 5y^4 + 2)$

# The Distributive Property

Distributive Property:

Basic Property -

$$a(b + c) = ab + ac$$

Binomials -

$$(a + b)(c + d) = a(c + d) + b(c + d)$$
$$ac + ad + bc + bd$$

# The Distributive Property Continued...

Binomial and Trinomial -

$$(a + b)(c + d + e) = a(c + d + e) + b(c + d + e)$$
$$= ac + ad + ae + bc + bd + be$$

Trinomial and Binomial -

$$(c + d + e)(a + b) = c(a + b) + d(a + b) + e(a + b)$$
$$= ca + cb + da + db + ea + eb$$

Trinomial and Trinomial -

$$(a + b + c)(d + e + f) = a(d + e + f) + b(d + e + f) + c(d + e + f)$$
$$= ad + ae + af + bd + be + bf + cd + ce + cf$$

## Old News, but Good News

FOIL (First Outer Inner Last) -

A process that helps to multiply polynomials.

Why are we not covering it in detail though?

FOIL is great when you are working with just a binomial times a binomial. However, we will be working with all the processes that have been described on the previous two pages.

## Procedure

Step 1:

Using the appropriate distributive property from the 5 that were covered expand.

Step 2:

Underline/Highlight like terms

Step 3:

Combine like terms.

Step 4:

Put the solution in standard form.

## Examples

Multiply the following polynomials:

1. $-8x(-3x + 7)$

$-8x(-3x) - 8x(7)$

$\boxed{24x^2 - 56x}$

2. $5(6x - 11)$

$5(6x) + 5(-11)$

$\boxed{30x - 55}$

# More Examples

Multiply the following polynomials:

3. $(x + 3)(x - 1)$

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

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

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

$\boxed{x^2 + 2x - 3}$

4. $(4n + 1)(3n + 2)$

$4n(3n+2) + 1(3n+2)$

$4n(3n) + 4n(2) + 1(3n) + 1(2)$

$12n^2 + 8n + 3n + 2$

$\boxed{12n^2 + 11n + 2}$

# More Examples

Multiply the following polynomials:

5. $(x - 5)(2x^2 - 3x - 7)$

$$x(2x^2 - 3x - 7) - 5(2x^2 - 3x - 7)$$

$$x(2x^2) + x(-3x) + x(-7) - 5(2x^2) - 5(-3x) - 5(-7)$$

$$2x^3 - 3x^2 - 7x - 10x^2 + 15x + 35$$

$$\boxed{2x^3 - 13x^2 + 8x + 35}$$

# More Examples

Multiply the following polynomials:

6. $(-5x^2 + 2x - 3)(3x + 10)$

$$-5x^2(3x+10) + 2x(3x+10) - 3(3x+10)$$

$$-5x^2(3x) - 5x^2(10) + 2x(3x) + 2x(10) - 3(3x) - 3(10)$$

$$-15x^3 - 50x^2 + 6x^2 + 20x - 9x - 30$$

$$\boxed{-15x^3 - 44x^2 + 11x - 30}$$

# Final Example

Multiply the following polynomials:

7. $(x^2 - 3x + 6)(4x^2 + 3x - 5)$

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

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

$$4x^4 + 3x^3 - 5x^2 - 12x^3 - 9x^2 + 15x + 24x^2 + 18x - 30$$

$$\boxed{4x^4 - 9x^3 + 10x^2 + 33x - 30}$$