Name: _____ Date: _____

AIM: How do we factor non-linear algebraic expressions?

Simplify each expression.

1.) $x^3 \cdot x^4$ x^7	2.) $3x^2 \cdot 2x^5$ $6x^7$	3.) $x \cdot x$ x^2	4.) $6x \cdot 2x$ $12x^2$
5.) $\frac{x^4}{x^2}$ x^2	6.) $2(x+3)$ $2x+6$	7.) $-3(x^2+2x-1)$ $-3x^2-6x+3$	8.) $4x(x-5)$ $4x^2-20x$

Non-linear Algebraic Expression:

An algebraic expression that contains at least one term with an exponent greater than 1 is said to be non linear

Simplify each expression using the distributive property. Remember to use the Laws of Exponents!

1.) $4x^1(x^1+5)$ $4x^2+20x$	2.) $5a^2(2a^1-3)$ $10a^3-15a^2$	3.) $3y^1(5y^1+6)$ $15y^2+18y$
4.) $2c^1(-7c^1+1)$ $-14c^2+2c$	5.) $2n^3(n^3-3n^1+7)$ $2n^6-6n^4+14n^3$	

$$4x(x + 5) = 4x^2 + 20x$$

Factor out the GCF of $\frac{4x^2}{4x} + \frac{20x}{4x}$

$4x(1x + 5)$

First Factor: GCF

Second Factor: Quotient from dividing each term by the GCF

1.) Factor: $\frac{5x^2}{1x} + \frac{3x}{1x}$ $x(5x + 3)$	4.) Factor: $\frac{6x^6}{6x^3} + \frac{72x^4}{6x^3} - \frac{12x^3}{6x^3}$ $6x^3(1x^3 + 12x - 2)$
2.) Factor: $\frac{12x^2y}{4x^2y} + \frac{8x^3y^2}{4x^2y}$ $4x^2y(3 + 2xy)$	5.) Factor: $\frac{5x^2y^3}{5xy} - \frac{10x^4y^2}{5xy} + \frac{15xy}{5xy}$ $5xy(1xy^2 - 2x^3y + 3)$
3.) Factor: $\frac{18ab^3}{6ab^3} + \frac{30a^3b^3}{6ab^3}$ $6ab^3(3 + 5a^2)$	6.) Factor: $\frac{16a^4b^2}{4ab} - \frac{4ab}{4ab}$ $4ab(4a^3b - 1)$

7.) Factor $2x^6 + 10x^4 - 12x^3$

$2x^3$ $2x^3$ $2x^3$

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

8.) Factor: $45x^2y^3 - 15xy^2 + 30xy$

$5xy$ $5xy$ $5xy$

$5xy (9xy^2 - 3y + 6)$

9.) Factor: $4x^5 + 2x^4 + 12x^3$

$2x^3$ $2x^3$ $2x^3$

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

The TAKEAWAY

1.) What is the difference between a linear algebraic expression and a nonlinear algebraic expression?

linear: has at most 1 variable in each term to 1st power

nonlinear: may have multiple variables to higher powers than 1

2.) Factor $8x^2 + 8x$

$8x(x + 1)$