Unit 8 Notes:
GCF of a Polynomial/Zero Product Property

Name KEY

Objectives:
- Identify the algebraic GCF of a polynomial expression.
- Factor out the GCF of a polynomial expression.
- Use the zero product property to find the solutions of an equation.

Algebraic GCF: THE GREATEST COMMON FACTOR IS THE LARGEST FACTOR THAT ALL TERMS HAVE IN COMMON.

Practice 1: Find the algebraic GCF of the terms indicated.

a) x^5, x^3 GCF = x^3

b) x^5y^2, x^2y^6 GCF = x^2y^2

c) a^2cd^3, a^2d^5 GCF = a^2d^3

d) $4x^3y^2, 6x^5y^4$ GCF = $2x^3y^2$

e) $12a^2c^4d^3, 16ac^7d^3, 24a^2c^5d^3$ GCF = $4ac^4d^2$

Factoring Out a GCF

"UNDO THE DISTRIBUTIVE PROPERTY"

Factoring the GCF from a polynomials is the reverse of the DISTRIBUTIVE property.

Distributing	Factoring
$2x(x+3)$	$2x^2+6x$ → FIND GCF OF BOTH TERMS
$2x^2+6x$	$2x(x+3)$

Practice 2: Find the GCF and factor completely!

a. $5x+10$ → $5(x+2)$

b. $12x^4-3x^2$ → $3x^2(4x^2-1)$

c. $20x^6y^2+30x^3y^5$ → $10x^3y^2(2x^3+3y^3)$

d. $20a^3c^2d-5a^4c^3d^2+15a^2cd^3e$ → $5a^2cd(4ac-1a^2c^2d+3d^2e)$

e. $14x^6y^3z + 8xy^2 - 2z$

$2(7x^6y^3z + 4xy^2 - z)$

f. $5x^2y + 7ac$

CAN-NOT BE FACTORED

Zero Product Property

-USE FACTORIN TO SOLVE FOR ZEROS

****If $(a \cdot b) = 0$, then either a or b is equal to zero!!**

****There should be as many zeros as variables that you see!!!******

Practice 3: Use the zero product property to find all the zeros. → SET EACH FACTOR EQUAL TO ZERO AND SOLVE.

a. $x(x+1) = 0$

$X = 0$ ✓

$X + 1 = 0$

$-1 \quad -1$

$X = -1$ ✓

CHECK

$0(0+1) = 0$ | $-1(-1+1) = 0$

$0(1) = 0$ ✓ | $-1(0) = 0$ ✓

$0 = 0$ | $0 = 0$

b. $2x(4x-5) = 0$

$\frac{2X}{2} = \frac{0}{2}$

$X = 0$

$4X - 5 = 0$

$+5 \quad +5$

$\frac{4X}{4} = \frac{5}{4}$

$X = \frac{5}{4}$

c. $2(x-5)(3x-4) = 0$

$X - 5 = 0$

$+5 \quad +5$

$X = 5$

$3X - 4 = 0$

$+4 \quad +4$

$\frac{3X}{3} = \frac{4}{3}$

$X = \frac{4}{3}$

d. $7x(2x+1)(3x-4) = 0$

$\frac{7X}{7} = \frac{0}{7}$

$X = 0$

$2X + 1 = 0$

$-1 \quad -1$

$\frac{2X}{2} = \frac{-1}{2}$

$X = -\frac{1}{2}$

$3X - 4 = 0$

$\frac{3X}{3} = \frac{4}{3}$

$X = \frac{4}{3}$

*SOMETHING IS ONLY A FACTOR IF IT HAS A VARIABLE

Combination Problems

*FACTOR THEN SOLVE

Practice 4: Use the zero product property to find all the zeros.

a. $2x^2 - 12x = 0$

FACTOR

$2X(X-6) = 0$

SOLVE-FIND ZEROS

$\frac{2X}{2} = \frac{0}{2}$

$X = 0$

$X - 6 = 0$

$+6 \quad +6$

$X = 6$

b. $7x + 14 = 0$

$7(X+2) = 0$

$X + 2 = 0$

$-2 \quad -2$

$X = -2$

c. $4x + 10x^2 = 0$

$2X(2+5X) = 0$

$\frac{2X}{2} = \frac{0}{2}$

$X = 0$

$2 + 5X = 0$

$-2 \quad -2$

$\frac{5X}{5} = \frac{-2}{5}$

$X = -\frac{2}{5}$

d. $27g^2 - 9g = 0$

$9g(3g-1) = 0$

$\frac{9g}{9} = \frac{0}{9}$

$g = 0$

$3g - 1 = 0$

$+1 \quad +1$

$\frac{3g}{3} = \frac{1}{3}$

$g = \frac{1}{3}$