PRINCIPLES - LESSON 12B
FACTORING BY GCF METHOD

GCF = Greatest Common Factor
(the largest number that goes into other numbers)

ex1) **What is the GCF of 18 and 27?**

$18 = 2 \cdot 3 \cdot 3$

$27 = 3 \cdot 3 \cdot 3$

} GCF $= 3 \cdot 3 = 9$

GCF

ex2) What is the GCF of $6x^2y$ and $9x^3y^2$?

$6x^2y = 2 \cdot 3 \cdot x \cdot x \cdot y$

$9x^3y^2 = 3 \cdot 3 \cdot x \cdot x \cdot x \cdot y \cdot y$

$3 \cdot x \cdot x \cdot y$

GCF = $3x^2y$

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ex3) What is the GCF of $14a^5b^3$ and $21a^3b^7$?

$14a^5b^3 = 2 \cdot 7 \cdot a \cdot a \cdot a \cdot a \cdot a \cdot b \cdot b \cdot b$

$21a^3b^7 = 3 \cdot 7 \cdot a \cdot a \cdot a \cdot b \cdot b \cdot b \cdot b \cdot b \cdot b \cdot b$

GCF = $7a^3b^3$

DISTRIBUTIVE PROPERTY

Recall: The Distributive Property

Simplify.

ex4) $14a(a-2)$

$= 14a^2 - 28a$

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ex5) $4r^2t^2(5r^3 + 2rt - 6t^2)$

$= 20r^5t^2 + 8r^3t^3 - 24r^2t^4$

REVERSING THE DISTRIBUTIVE PROPERTY

TO FACTOR = to rewrite a polynomial as a product (to write as things being multiplied together)

Factor.

Find the GCF of all terms of the polynomial and then reverse distribute it from each term.

ex6) $14a^2 - 28a$

$= \underbrace{14a}_{\text{GCF}}\left(\underbrace{a - 2}_{\text{leftovers}}\right)$

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ex7) $20r^5t^2 + 8r^3t^3 - 24r^2t^4$

$= \underbrace{4r^2t^2}_{\text{GCF}}\left(\underbrace{5r^3 + 2rt - 6t^2}_{\text{leftovers}}\right)$

#6 and #7 are the reverse of problems #4 and #5

FACTORING POLYNOMIALS BY THE GCF METHOD

Factor by GCF.

ex8) $2x^3 + 4x^2 - 2x$

$= \underbrace{2x}_{\text{GCF}}\left(\underbrace{x^2 + 2x - 1}_{\text{leftovers}}\right)$

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ex9) $18x^5 + 12y^3$

$= \underbrace{6}_{\text{GCF}}\left(\underbrace{3x^5 + 2y^3}_{\text{leftovers}}\right)$

A GCF doesn't have to contain variables.

Sometimes, there are no common variables.

FACTORING POLYNOMIALS BY THE GCF METHOD

Factor by GCF.

ex10) $5w^4 + 6w^3 - 7w^2 + 11w$

A GCF doesn't have to contain number values. Sometimes, these are no common numbers.

$= \underbrace{w}_{\text{GCF}}(\underbrace{5w^3 + 6w^2 - 7w + 11}_{\text{leftovers}})$

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ex11) $n^2 + 10n + 21$

These terms have no common numbers or variables.

We cannot factor this trinomial by the GCF method.