

Factoring Polynomials by...

Greatest Common Factor (GCF)

Coefficient \rightarrow $6x^2$ \leftarrow Exponent
Variable

Steps to Factoring Polynomials using GCF

- 1) Find the GCF of the Coefficients
- 2) Find the GCF of the Variables (smallest exponent)
- 3) Divide each term by the GCF
- 4) Write GCF on outside of parentheses
- 5) Write "What's left" of each term inside the parentheses
- 6) Check your work

Examples:

<p>1) $\frac{56x^3}{8} - \frac{72y^2}{8}$ GCF: 8</p> <p>$8(7x^3 - 9y^2)$</p> <p>check: $8(7x^3 - 9y^2)$ $56x^3 - 72y^2 \checkmark$</p>	<p>2) $\frac{15x^5}{3x^3} + \frac{12x^3}{3x^3}$ GCF: $3x^3$</p> <p>$3x^3(5x^2 + 4)$</p> <p>check: $3x^3(5x^2 + 4)$ $15x^5 + 12x^3 \checkmark$</p>
<p>3) $\frac{x^3y}{1xy} - \frac{4x^2y^2}{1xy} + \frac{12xy^3}{1xy}$ GCF: $1xy$</p> <p>$xy(x^2 - 4xy + 12y^2)$</p> <p>check: $xy(x^2 - 4xy + 12y^2)$ $\checkmark x^3y - 4x^2y^2 + 12xy^3$</p>	<p>4) $\frac{40x^3}{5x} - \frac{20x^2}{5x} + \frac{15x}{5x}$ GCF: $5x$</p> <p>$5x(8x^2 - 4x + 3)$</p> <p>check: $5x(8x^2 - 4x + 3)$ $40x^3 - 20x^2 + 15x \checkmark$</p>

Factor By Grouping

Use when factoring polynomials with 4 terms

1) Group terms together that have common factors (should make 2 binomials)	$\left(\frac{x^3}{x^2} + \frac{9x^2}{x^2}\right) + \left(\frac{-2x}{-2} - \frac{18}{-2}\right)$ $x^2(x+9) - 2(x+9)$
2) Identify GCF in EACH new binomial	
3) Factor out GCF from EACH binomial	$(x+9)(x^2-2)$
4) Factor out common binomial factor	<p>check: $(x+9)(x^2-2)$</p>
5) Check by multiplying (Box method or FOIL)	$x^3 + 9x^2 - 2x - 18 \checkmark$

Example 1:

$$\left(\frac{x^3}{x^2} - \frac{4x^2}{x^2}\right) + \left(\frac{3x}{3} - \frac{12}{3}\right)$$

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

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

check:

	x	-4
x^2	x^3	$-4x^2$
$+3$	$+3x$	-12

$$x^3 - 4x^2 + 3x - 12 \checkmark$$

Example 2:

$$\left(\frac{x^6}{x^5} - \frac{5x^5}{x^5}\right) + \left(\frac{3x^4}{3 \times 3} - \frac{15x^3}{3 \times 3}\right)$$

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

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

check:

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

$$x^6 + 3x^4 - 5x^5 - 15x^3$$

$$\checkmark x^6 - 5x^5 + 3x^4 - 15x^3$$

$$1) (x^3 + 9x^2 + 4xy + 36y)$$
$$x^2(x+9) + 4y(x+9)$$
$$(x+9)(x^2 + 4y)$$

$$2) (7x^3 + 7x^2 + 5x + 5)$$
$$7x^2(x+1) + 5(x+1)$$
$$(x+1)(7x^2 + 5)$$

$$3) x^3 - 2x^2 - 9x + 18$$

$$x^2(x-2) - 9(x-2)$$
$$(x-2)(x^2 - 9)$$
$$(x-2)(x-3)(x+3)$$

$$4) x^3 + 3x^2 - 5x - 15$$

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

GLUE HERE